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Visuals as Semiotic Sites: Approaching Anticipation Through a Process-Oriented Semiotic Lens

Futures Studies, Finland Futures Research Centre
Master's thesis

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Master's thesis**Subject:** Futures Studies**Author:** Zainab Yasin**Title:** Visuals as semiotic sites – Approaching anticipation through a process-oriented semiotic lens**Supervisor(s):** Leena Jokinen; Martyn Richards**Number of pages:** 88 pages + appendices 8 pages**Date:** 27.5.2026**Abstract**

The study approaches anticipatory processes through a semiotic lens, using visual signs as a site for meaning making and interpretation. Capitalizing on the ambiguity inherent in visual signs, the study employs hand-drawn visuals as empirical entry points to materialize, reveal, and trace the effects on anticipatory assumptions resulting through interpretive plurality surrounding visual signs. The two iterative Futures Literacy Labs, both of differing epistemic purposes, were conducted to engage with anticipatory processes at two different levels of anticipation i.e., anticipation-for-the-future and anticipation-for-emergence. The first lab, however, functioned as an exploratory observational setting guiding the methodological orientation of the study, meanwhile, the second lab was theoretically grounded in semiotic inquiry and produced the empirical material analyzed in relation to anticipation and semiosis. The study focused on individual and collective drawing activities, with a primary emphasis on visual interpretation and meaning making, articulation of assumptions, and shared visual engagement and idea exchange. Furthermore, the study emphasized on how signs extend along with the meanings, ambiguity intensifies, ideas coalesce, and underlying assumptions loosen their grip, paving a way to observe emergence and novelty.

Employing qualitative and process-oriented semiotic analysis approaches, the research investigates the potential of using visuals in futures research to articulate and surface anticipatory assumptions, and use of the interpretive plurality in a collaborative setting to broaden one's anticipatory frames. The findings demonstrate that the meaning does not reside in a (visual) sign and constantly remains in flux amid interaction. Moreover, becoming aware of one's assumptions and recognizing the existence of alternative ways of anticipating when a wider range of assumptions surfaced, alongside encountering an unfamiliar yet challenging future, opened space to engage playfully with uncertainty and reimagining present assumptions. The paper concludes by acknowledging that it is within this space of interpretative openness that a movement toward anticipation-for-emergence becomes possible, not as a definitive transition, but as a gradual reorientation in how meaning is approached.

Keywords: Semiosis, anticipation, visual semiotic sites, meaning making, emergence.

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1 Introduction

In everyday life, humans constantly orient themselves toward what might happen next. This orientation, often labelled as anticipation, shapes how situations are perceived and acted upon the present. Actions, interpretations, and decisions are shaped not merely by what is immediately present, but by past experiences and expectations of what could unfold. These expectations are rarely formed in isolation, rather they ascend through how humans make sense of experiences, situations, and signals around them. Despite its centrality, anticipation is often explored in terms of outcomes rather than its operational aspects, or the processes through which it becomes visible and subject to change. This research shifts focus to these processes by approaching anticipation as inherently tied to meaning making. Anticipation is no longer a background cognitive function but an active, meaning-making process that shapes what can be perceived, engaged with, and articulated. Particularly, it analyses how anticipatory assumptions are surfaced, interpreted, and reconfigured using visual semiotic signs.

1.1 Motivation for the topic

“Do different people see the same thing when they view the same external world? The short answer is no. Even the same person sees the same thing differently each time they look at it” (Daigle, 2023). The duck-rabbit image introduced by Jastrow (1899), sparked a philosophical debate, leading to a sheer volume of literature explaining how the same figure can be perceived in different ways – one viewer seeing a duck, another seeing a rabbit, and often oscillating between the two. Why is that? Does the variability lie in the image, interpretation, or the perception of mind? It is precisely this ambiguity and openness which makes visuals a methodologically compelling tool for the current research. Nonetheless, the divergent interpretations of the same visual point to something fundamental about how individuals construct meaning, and, by extension, construct their understanding of what is yet to come. Prior to meaning making, the process of drawing itself enhances the curiosity to explore how individuals externalise what is otherwise implicit beyond words solely, and most significantly, how visuals influence imagination, participation, and meaning making oriented toward the future.

These characteristics of visuals create a productive space for their use across diverse contexts, including futures-oriented settings that seek to embrace plurality, creative thinking, and encourage awareness of anticipatory practices. Despite the omnipresence of the use of visuals in representing ideas and provoking futures thinking, visuals remain undertheorized and are frequently treated as

outputs or representations (Argudo-Portal and Canals, 2026) rather than ambiguous signs that invite multiple interpretations and aid anticipatory processes. This tendency reduces their analytical potential, limiting them to static artefacts, overlooking their dynamics within a broader practice of meaning-making.

Although visuals can be studied from various perspectives, including ‘why’ they can be seen, interpreted, and perceived differently and ‘how’ their inherent ambiguity can be used to examine a phenomenon, this study adopts the latter approach, using visual signs to explore anticipatory processes. Visuals do not carry fixed meanings neither are they the carriers of rigid realities (Wittgenstein, 1989); they are rather intrinsically open, allowing different individuals to interpret the same representation differently. By allowing diverse interpretations to emerge, ambiguity becomes a productive condition instead of a limitation. The research extends to the collective dimension of meaning making, such that it yields different outputs than individual setting (Weldon and Bellinger, 1997). Through individual and collective imagination, visual signs become sites where meaning is constantly constructed, destabilised, and negotiated, and as meaning remains in flux, anticipation gradually and correspondingly also becomes open to reconfiguration. In other words, initiating a sequence of metacognition processes of visual sign creation and meaning exchange, study searches for grounds to challenge, deconstruct, and reconfigure one’s assumptions on novel grounds.

Another motivation to incline toward collective meaning making is because when shared among individuals, visuals become a shared entity, leading to the emergence of multiple and alternative interpretations. Individuals interpret visual signs taking into consideration their diverse perspectives, experiences, preference, and orientation towards what might happen next, i.e., a flower as a sign of spring. Considering this, and that the meanings making is a never-ending loop, the research derives its impetus not only from exploring the potential of visual representations within futures-oriented settings, but also from examining the underlying phenomenon, namely semiosis, that enables such potential and perhaps reorients one’s interpretive capacity. Within this framework, visuals are not understood as endpoints, but as empirical entry points into ongoing processes of meaning making. while Lehtikoinen and Tuittila (2024) reflected on artistic future images as generative artefacts in futures workshops, and Karaïskou (2024) explored visual literacy as a tool for examining anticipations in educational contexts, these contributions suggest, but do not fully address, the semiotic dynamics that unfold when visual signs creation and interpretation move from the individual to the collective level.

It is at this intersection – between the anticipatory processes and semiotics of visual signs – that this research positions itself. The motivation for this research is therefore twofold, first, to explore how individual visual drawing can make implicit assumption explicit that underpin a person’s orientation toward the future, and second, to investigate how collective sign creation and interpretation influence those assumptions.

1.2 Anticipation is (already) semiotic

A notification appears on a phone: a delayed response, a brief message, or a missed call. It might seem as a minor and ordinary event, yet it rarely remains neutral. What is present is minimal, yet what it refers to expands beyond the moment. It is seen, interpreted, and connected to the past experiences and possible futures. When something is interpreted beyond itself, it acts as a sign (Atkin, 2018). In this sense and following Peirce (Chandler, 2022), human thinking can be understood as mediated by signs, and signs are interpretable. This everyday act displays something fundamental. People do not react only to what is directly visible, they interpret it, and through interpretation, relate it to what might follow. When a response, a tone, or a pattern is taken as indicators for something ahead, the present remains continuously linked to the future through these interpretations. The sign interpretation can occur for the near- or long-term futures, for instance, interpreting dark clouds as a sign of rain in the near term, or studying in the present as a sign of future employment.

Anticipation emerges during the process of sign interpretation. Interpretation does not occur in isolation, rather it is shaped by expectations, prior experiences, emotions, cultural contexts, social norms, and so on. For instance, Siivonen (2007) reflects on the role of cultural and situational contexts in sign interpretation, Kristeva (1986) points to the past experiences, Gentile (2025) refers to human cognition and memory storage, and Nadin (2022) brings in the influence of possible futures, apart from the past, in one’s horizon of sign interpretation. As individuals make sense of signs by connecting these vast aspects to the future outcomes and extending the meanings towards what is not-yet, the interpretive processes influence their anticipatory frames, which then inform how they imagine the future and act in the present. At the same time, people tend to orient themselves, cognitively or instinctively, toward what appears more plausible and probable – staying within the loop of what feels natural, expected, and familiar. This study approaches anticipation as mediated through meaning making, operating through sign interpretation.

1.3 Research questions and aims

This thesis aims to explore the potential of visuals in futures research, capitalizing on their ambiguous and open nature and provoking interpretive plurality to broaden anticipatory frames of the participants. Through individual and collective sign creation, it aims to surface anticipatory assumptions which are otherwise implicit, and through the process of interpretation, it aims to investigate the changes and effects on these assumptions. Emphasis is placed on meanings associated with the signs, which reflect on the embedded anticipatory assumptions of both, interpreters and illustrators.

While futures studies discipline, and particularly futures literacy, discusses anticipation extensively (Miller, 2018), and semiotics discusses meaning making extensively, there is a limited understanding of how semiotic processes of meaning making can be studied to trace, reveal, and challenge anticipatory processes within a collaborative and interpretive setting. Moreover, limited attention has been given to how anticipatory processes themselves become visible, and discussion is solely focused on the content or outcomes of imagined futures. The study aims to consider how anticipatory assumptions can be unfolded, articulated, and at instances, reconfigured and expanded. Such that, it traces anticipatory thinking and semiotic moment particularly in relation to anticipation-for-the-future and anticipation-for-emergence. The potential of collective sign creation and interpretation is explored deeply in the thesis as it enriches the discussion and semiotic processes. Therefore, taking a semiotic perspective, the study intends to correlate anticipatory processes to limited semiotic engagement within a particular setting and, in doing so, contributes to the field of futures literacy.

The two research questions which guide the study are:

RQ1: How do hand-drawn visual signs render anticipatory assumptions visible within the methodological setting of Futures Literacy Labs, surfacing a wider range of assumptions?

RQ2: How does the process of collective sign making and their simultaneous interpretation influence participants' anticipatory assumptions?

RQ1 aims to explore the potential of visual signs which participants draw individually and circulate in the group. It examines how the process of drawing making and interpretation renders anticipatory assumptions visible, and how static visual signs created by one individual can generate multiple interpretations, revealing polysemic nature of visuals as well as plurality of assumptions held by both illustrators and interpreters. The question is limited to revealing the probable and preferred

futures imagined by the participants. RQ2 aims to examine the trace semiotic process of collective signs creation and simultaneous interpretation, where meaning making is carried out collaboratively across a challenging future. It aims to trace the influences on anticipatory assumptions of participants when visual signs are no longer created individually or are static, rather, signs and meanings both are constantly in flux. Studying this process in a collective setting is crucial because assumptions can be surfaced through individual drawing and further reflected upon through sequential interpretations – observed through RQ1 – but collective sign making aims to render these assumptions not only visible but negotiable by placing them in relation to alternative signs and interpretations, and specifically, future orientations. Through this process, anticipation can be examined as a dynamic and socially mediated process of meaning making. It investigates how participants collaboratively interact with visual artefacts to build upon, extend, and modify not only the signs but their meanings – and how it influences their anticipatory assumptions. Through examining the dynamics of meaning making across individual and collective settings, the research investigates the analytical potential of visuals as semiotic sites for revealing and reconfiguring anticipatory processes.

1.4 Structure of the thesis

After this introductory chapter, the research proceeds as follows. In chapter 2, the theoretical framework is presented by introducing the key concepts and approaches that inform the study. Chapter 3 details the methodology, explaining the research design, empirical setting, and process of data collection and analysis. Chapter 4 presents the analysis, focusing on answering the research questions and summarizes the findings of questions. In chapter 5, discussion positions findings within the broader conceptual framework, correlation between the key terms is developed, and contributions of the research are highlighted. Finally, chapter 6 concludes the thesis by summarizing the key observations and insights.

2 Theoretical framework

This chapter outlines the theoretical framework and key terms that underpin the research. Beginning with the core concept, the section intends to conceptualize anticipation referring to various scholars and to reflect on its application within the realm of futures literacy. It then defines the second core concept, semiotics, how it is defined and connected to anticipation, and later explains the significance of visual signs among all other signs to be studied as semiotic sites in futures-oriented settings.

2.1 Explaining the concept of anticipation

Anticipation refers to the presence of future in the present. As future itself cannot exist in the present, therefore the form the future takes in the present is anticipation (Miller, 2018). It is the future-based information taking over in the present (Poli, 2017a). Such that, “all efforts to ‘know the future’ in the sense of thinking about and using the future are forms of anticipation” (Miller et al., 2013). It exists in various forms – volitional and non-volitional, explicit and implicit (beyond one’s threshold of awareness) – significantly determining our actions and feelings (Miller, 2006).

Most definitions of anticipation are action oriented i.e., require some action in the present. The foundational scientific treatment of the term of anticipation traces back to the theoretical biologist, Robert Rosen (1985), who defined anticipation as a basic capacity of living systems to take the later-than-now into consideration in ways which affect how they ‘function’. The emphasis on ‘functioning’ here provides an ‘actionable dimension’ to the concept of anticipation (Miller, 2018), meaning anticipation does not only represent thinking about later-than-now, but influences the present behaviour and therefore the functioning (contrary to a reactive system which only reacts when the change has occurred). Anticipation is always expressed in ‘action’, through which our perception of the future is materialised (Nadin, 2017).

Rosen’s anticipatory theory, reflected upon by Louie (2010), suggests that the present behaviour of an anticipatory system depends upon “future inputs” or “future states” produced by an internal predictive model. The core insight of the theory is that *all* living beings have predictive models of themselves and of their environment, termed as ‘anticipatory models’ which pull the future into the present (Rosen, 2012). According to theory of anticipation, life in all its varieties is anticipatory (Poli, 2010) and anticipation does not occur uniformly across all living beings (Rosen, 1985). Every single-celled organism integrates the later-than-now in ways which are relevant to its functioning. They all vary in their structure, complexity, and organization. While Rosen’s conception of

operating based on predictive model applies broadly to living systems, main fields of futures studies and futures literacy centre specifically on human anticipation. It is crucial, and a capability, to distinguish anticipatory systems that operationalise future of different kinds i.e., optimisation, contingency, and novel futures (explained in section 2.2).

Drawing on Rosen's (2012) anticipatory systems components, later returned to by Roberto Poli (2017b), 'anticipatory system' is a system that has a model of itself (representation) or its environment and utilizes this model to alter what happens now based on what is expected or predicted to happen later. However, it does not refer to the ability to "see" the future, instead it suggests that there must be some information encoded into all living systems. This information is capable of acting causally on the present behaviour of the living beings, based on expectations about what might happen in the future. Anticipatory model can be external i.e., forecasts, or internal i.e., expectations or beliefs. Anticipatory assumptions often operate on the internal models in humans and social institutions. The significance of understanding internal models lies in the fact that they shape how futures are imagined and acted upon. 'Anticipatory assumptions' can be referred to as internal models guiding present action and are the basic building blocks of the human's thinking.

Poli (2017a) himself defines anticipation in its non-technical term refers to all forward-looking activities and attitudes, meanwhile in its technical term, it refers to the third level of futures studies – beyond forecast and foresight modelling – and a concept used in anticipatory systems. Through an example of a weather forecast, he suggests that the forecast itself is not anticipatory, instead taking an action of bringing an umbrella along before leaving can be aligned with an anticipatory behaviour. Nonetheless, anticipation is not a recipe for success, it only helps develop more sophisticated courses of action. It is a mean to imagine actions which can only be verified once the future really appears (Poli, 2017a).

2.1.1 The Discipline of Anticipation (DoA)

According to mainstream psychology, human action is vastly determined by the past. It suggests that anticipation is "a violation of natural law because future cannot act on the present" (Seligman et al., 2013). Contrary to this, anticipation is guided not by the future itself, but the present representations of possible future states. This navigation into the future is deemed as a core organising principle of living beings, including animals and humans' behaviour. Even though past is no longer a driving force, it can be a resource from which selective information, such as previous and entirely new possibilities, can be extracted (Seligman et al., 2013.). Along with psychology,

different disciplines, including anthropology, economy, and sociology etc., have begun rethinking the significance of anticipatory attitude (Poli, 2014).

Within futures studies, the endeavour to establish a full-fledged “Discipline of Anticipation” (DoA) seeks to provide a unifying framework for understanding anticipation across disciplines, bridging insights from social sciences and futures practice (Miller et al., 2013). DoA encompasses all “ways of knowing” the later-than-now, or simply the future as anticipation, including the forms of anticipation which can be observed, i.e., a tree losing its leaves in Autumn, to human planning which obstructs from making sense of emergent novelty. Investing in DoA can improve the conscious use of the future in the present, however, perfect anticipation both practically and theoretically is not achievable in our universe (UNESCO, 2014).

2.1.2 Implicit and explicit anticipation

Humans incorporate the future into present decision-making via two primary modes, namely, explicit and implicit anticipation. Explicit anticipation is conscious, deliberate, and cognitively accessible orientation toward the future and is often verbalized. The future here is an object of attention, such that, a person intentionally engages with future possibilities, predictions, and projections. Meanwhile, implicit anticipation is usually unarticulated, automatic, and often under the threshold of one's awareness. The future still guides the behaviour of individuals but without direct intentional articulation. Both modes of anticipation are formed and influenced by several factors. For instance, humans knowingly or unknowingly use past experiences or acquired knowledge as a ‘suggestive framework’ to construct new ideas regarding the future (Zheng et al., 2014). Moreover, anticipation is a calibrated cognitive posture involving a continuous, dynamic act of reading ahead emotionally, intellectually, and rhetorically. It develops from interpreter’s knowledge, and sensitivity to context among other factors (Bezzaoucha, 2025). Following Rosen, anticipation could also be merely a basic feature of how systems function, independent of the past, however, it is a strong claim and needs more evidence. Nadin (2015), complying with Rosen, takes an approach of defining anticipation as not only as dependent on previous states i.e., deterministic dimension, but vastly relying on ‘possible future states’ i.e., possibilistic dimension. Anticipation is often modelled as ‘control procedures’, however this is a limited view; it is an intrinsic property of systems that act in advance through its self-organising capacity (Nadin, 2015). In light of this, anticipation occurs due to many processes – some which are inherent in the living systems, others which are developed through learning, training or experience (Staff, 2004). The explicit anticipations, to some extent, can or cannot depend on implicit ones, however, they can be based on entirely different enabling conditions or systems. Implicit anticipation is formed continuously.

Although human beings anticipate all the time, such that “any attempt to plan, to contemplate or, simply, talk about the future involves tacit anticipatory assumptions” (Karaiskou, 2024), these assumptions can be sensed but not immediately known and are imbedded in our automatisms, leading to predetermination of our actions and futures thinking. Furthermore, this kind of anticipation is often not accessible to introspection and as it often occurs spontaneously (Seligman et al., 2013). There are other theories which explain anticipation, for instance philosophy, biology, brain studies, futures studies, and semiotics (Poli, 2010).

2.1.3 Key concepts

This subsection enlists the core concepts related to anticipation and develops the foundation for understanding how these concepts are specifically tailored to this research.

-Anticipatory systems (AS): “Human behaviour is mostly anticipatory and based on anticipatory systems and models” (Bergheim, 2026). Robert Rosen, whose work established the foundational scientific treatment of anticipation, developed a first rigorous framework for comprehending anticipatory systems (AS). Rosen defined AS as one which can encode and build models of self and environment for the purposes of system control and guidance and can use those models to change behaviour in the present as per the predicted future states. Such claim suggests that present behaviour is not solely driven by past inputs, by actively shaped by an internal model of what has not yet happened (Rosen, 1985; Louie, 2010). In comparison to reactive system which responds to the change which has already occurred, anticipatory system contains an “internal predictive model of itself and of its environment,” which permits it to change state at an instant based on predictions about a later instant (Louie, 2010).

-Anticipatory assumptions (AA): AS shape our present action by influencing our assumptions about the future. “Anticipatory assumptions are the key building blocks of our images of the future, of our anticipatory systems and processes” (Bergheim, 2026). These assumptions influence what we perceive and make sense of in the present and can be referred as internal models guiding present action. The term ‘assumption’ alone can be defined as something which is taken as being true and as a starting point for a course of action or reasoning, according to Merriam-Webster. These are the implicit and explicit expectations about the future which shape how situations are interpreted and acted upon in the present. These assumptions can be explicit or implicit i.e.; beyond one’s threshold of awareness. Such that, awareness of these assumptions allows one to explore novel or alternative sets of assumptions, future images, and actions in the present, and, more, to change the conditions of change. Futures Literacy Labs (FLLs) are specifically designed to reveal these assumption using

tools like Causal Layered Analysis (CLA) and Futures Wheel. However, this study proposes hand-drawn visual signs as one such observational tool, which can be particularly effective at revealing assumptions that resist verbal articulation. Therefore, in this study, AA are approached as implicit orientations towards the future which shapes how individuals imagine, perceive, and make sense of the future.

-Anticipation-for-the-future (AfF): This mode of anticipation operates on a more familiar mode. Such as, it operates by projecting existing trends, knowledge, expectations, and desires on the future, considering that the future is something which can be controlled, planned, and predicted. Being normative, goal-oriented, and inherently constrained by the present set of knowledge and values, AfF exclusively concentrates on assuming what will happen, setting and achieving goals, and what is known.

-Anticipation-for-emergence (AfE): Contrary to AfF, AfE operates on a mode that one has not yet imagined. To be more specific, it “is a use of the future to sense and make sense of aspects of the present, particularly novelty or unknown realm, which tends to be obscured by AfF” (Miller, 2018).

As it is put here in comparison to AfF, explaining both terms by referring to the phases of Futures Literacy Labs (FLLs) will assist in demonstrating them efficiently. As FLL typically entails three to four stages – namely, reveal, reframe, reflect, and invent – the existing frame of anticipatory assumptions which are surfaced during the reveal phase usually come under the category of AfF. These are the futures one is aware of and they reflect the known futures. Moving forward, the reframe phase where one encounters a challenging future, the existing anticipatory frames become less useful, and one extends the assumptions by rethinking in novel terms and embracing uncertainty (Miller, 2018.). However, it is difficult to differentiate the two modes of anticipation, considering they are also not fixed categories, however, becoming aware of the different modes of thinking about the future is one of the primary tasks of futures literacy. The terms are further explained in the section 2.2.3.

2.2 Futures literacy and anticipation

2.2.1 Futures studies and futures literacy

Futures studies (FS) as a discipline brings to light an important yet vastly overlooked aspect that it ‘futures’, not ‘future’. The plural term encounters the conceptual limitations of imagining only one default trajectory. FS claims that future is not singular, predictable, or fixed, rather plural, open, and changeable (Valciukas and Bell, 2007). The premise that multiple futures coexist as possibilities has

been a foundational feature of the domain since its earliest formulation (Masini, 1993). According to FS, future can be shaped by human agency. The anticipation approach asserts that the future is an active systemic driver already existing within present structures. Futures Literacy (FL) integrates these views from questioning ‘what the future will be’ to ‘how the future exists in the present’ (Miller, 2018). While FS overly relies on surfacing alternative futures, FL takes a step ahead by categorizing human imagination into optimization, contingency, and novelty (discussed below), to provide a comprehensive ontological framework that encompasses both goal-oriented traditions and forecasting and emergence and novelty-oriented aspects of anticipation. Epistemologically, as FS seeks to minimize uncertainty by creating plausible futures through scenario planning or other futures research methods, to inform present day decisions, FL shifts the focus from gathering knowledge about the futures to developing capacity to attentively choose between different ways of ‘using the future’.

2.2.2 Future and uses of the future

As future does not exist yet, it can be integrated into present – be it a millisecond or millennium – through anticipation. FL refers to the capability to understand *why* and *how* to use one’s imagination to introduce the non-existent future into the present by using-the-future (Miller, 2018). The analysis of FL must begin with defining what the future is. This is because, the understanding of the future defines what kind of a future one imagines and consequently generates differences in both what they perceive and the meanings they assign to with what they perceive. For instance, a person who assumes future to be predictable, planned, and fixed will search for trends and probabilities, meanwhile a person who thinks of the future as uncertain, indeterministic, and surprising will be open to alternatives and possibilities. It means that the understanding of the future shapes one’s perception and action in the present. Hence, there is no one future, rather futures.

According to Miller (2010), to be futures literate is to be capable of not only distinguishing different kinds of futures but realizing the “potential of the present”, in the same way as an accomplished reader would differentiate and invent various meanings from a given text. This refers to the capability to use-the-future to transform the present. The foundation for defining and exploring the capability to use-the-future is FL (Miller, 2018). Poli defined FL as the knowledge necessary to use-the-future in a way which aligns with the purpose. According to him, when a future is understood as an active force influencing our present, it becomes one of the most pertinent sense-making and value-generating force. He symbolised futures literacy with language literacy as both require acquisition of empowering knowledge (Poli, 2015.). For instance, a question “can you pass me the

sugar?” can literally be interpreted as a question, but through knowledge about the language one knows instantly that it is a request. Likewise, the knowledge one acquires through FL can enable them to know how to use the future. Bergheim (2022) defines FL as a competence pertaining to imagining the future for distinctive reasons using distinctive assumptions and models. Balcom Raleigh (2021) further expressed FL to be about diversifying why and how we use futures—prioritizing variety of actions. All definitions, though slightly different, point towards orientation toward action in the present through the use of the future. In this study, however, the focus is not put entirely on taking some action in the present. Although it comprises a major part, it remains unevaluated in this research; hence the study majorly capitalizes on the phases of FL to reveal and reframe the anticipatory assumptions of the participants.

What separates FL from everyday capability to use-the-future, such as to plan to visit friends and to cross the road carefully, is that it does not consider future as a destination we are travelling toward, but as a tool we use in the present which requires an explicit awareness of one’s assumptions and therefore actions. Taking a step further, it focuses on one’s capacity to discover and invent anticipatory assumptions. For instance, people might apply ‘crossing the road’ logic even to solve complex life problems, whilst FL helps one consciously choose how to imagine the future to act wisely in the present. Concerning explicit assumptions, the three key uses of the futures can be categorized: optimization, contingency, and novelty detailed in Table 1. Nonetheless, FL does not use the future to confirm one’s assumptions i.e., this might happen, instead it uses it to question the present assumptions, with a primary focus on skill development (Boer et al., 2018). FL activities rely on two assumptions: “future cannot be known, and what needs to be imagined about the future requires skills” (Feukeu, 2025). Rosen (1985) further states that future is not something which can be predicted, it is something which functions differently depending on different anticipatory systems involved and the unique internal models. Every single-celled organism perceives or relates to the future differently, trees cannot think of the future in same way as humans, and vice versa.

The “growing up” model demonstrates a common, often implicit, way of using the future to make sense of the present through linear extrapolation (Miller, 2018). For instance, a crawling baby is understood to grow up in a predictable developmental sequence i.e., from crawling to walking to running, and the future is perceived to unfold in a orderly and continuous progression. This depicts a forecasting logic, where the future is seen as an extrapolation of the present. Nonetheless, such a model disguises the contingent, non-linear, and emergent nature of lived experience, where growth does not essentially follow a determined trajectory. FL departs from both forecasting and foresight by questions the assumptions embedded in such models, involving the taken-for-granted concept of

“growth” itself. Rather than aiming to foresee and explore alternative scenarios within the same frame, FL equips participants with the ability to question and reconfigure the anticipatory assumptions that structure their understanding. In this sense, it moves attention from knowing the future to recognizing how different uses of the future influence what can be perceived and acted upon in the present.

Table 1. The three dimensions and uses of the future

The table below explains the main distinguishing points of the three futures on analytical grounds described by Miller (2010) and Poli (2017a). The material has been compiled into a form of a table by the research themselves, using the sources cited previously.

Optimization	Contingency	Novelty
This future occurs through planning i.e., planting crops to harvest later	This future comes from external events e.g., pandemics, economic crisis	This future involves novelty and emergence e.g., unexpected cultural shifts, and AI changing the world
Sees the future as separated from the present	Sees the future as separated from the present	Sees the future in the present itself (includes past as well)
Considers one specific future: extrapolation (causal-predictive model)	Acknowledges a range of futures (non-linear): anticipated surprises	Involves futures which are out of the range of one's anticipation: unpredictable and unknowable (Miller, 2012)
Motto: 'I am going toward the future'	Motto: 'the future is coming upon me'	Its partial sense is conveyed only afterwards.
Focus is on the next step (incremental innovation) or the outcome (planning).	Focus is on visible, selected, and perceived directions or unfocussed, vague, indeterminate ones (risk management).	Focus is on practices like learning and behaviours, or ideas like values and concepts.

2.2.3 Anticipation-for-the-future versus anticipation-for-emergence

FL does not privilege a single way of engaging with the future, it involves the capacity to navigate between two different anticipatory orientations. Miller's evocative metaphor of “walking on two legs”, refers to this dual capability and calls for a movement from being reliant on a single, dominant way of engaging with the future to a more plural and unconventional practice of anticipation. To reveal the ontological aspects of human's conscious use-of-the-future, Miller referred to Heidegger's (1962) distinction of “Being versus Beings”, symbolising two kinds of the anticipation – Anticipation-for-the-Future (AfF) versus Anticipation-for-Emergence (AfE). The “being” represents AfF as it is directed to one kind of a future – goal-oriented. It is the future which is desired or planned by individuals. Usually, optimization and contingency futures operate within an AfF logic. Contrarily, “beings” symbolize AfE pointing toward various kinds of futures that

deviate from a particular desire and strive to make sense of novelty in the present, hence it aligns more with novel futures. The future in AfE is imagined not as desirable or probable but as a disposable construct. Miller (2024) further iterated that freedom of imagination comes from two things: understanding different ways futures are described, and distinguishing between anticipation-for-the-future (AfF) and anticipation-for-emergence (AfE) and choice. What becomes specifically significant here is not the ontological distinction between the two forms of the futures, but the way in which they restructure how present is interpreted and acted upon (Miller, 2018).

Miller uses the metaphor “walking on two legs” – referring to Mao’s (1977) dual-paradigm slogan, which implies that inclusion of AfE is not equal to replacing one kind of anticipation with another, rather to make operating within different ontological uses of the future recognizable. Anticipation-for-emergence relies on anticipation-for-the-future in a way that after a person gets to know what they desire, only then the new form of anticipation can emerge. It then takes a person beyond their closed anticipatory systems and related knowledge creation process (KCP) into richness of complexity and out of reasonably safe space, where they previously resided. Where AfF stabilizes orientation, AfE by contrast loosens this stabilisation, through which present becomes porous, unsettled, and open to novelty. Novelty, which deals with discontinuity i.e., discovery or invention of the unknowable (Miller, 2015), depends on the questioning or reworking of the present set of assumptions or sense-making. In futures literacy, AfE precisely addresses the resources and needs that pull and push one’s capacity to embrace novelty (Poli, 2017b).

The movement from AfF to AfE is not epistemological in the first instance; instead, ontological. This is because it does not merely concern different ways of knowing the future, it rather involves a redefinition of what the future is. While AfF considers future as a goal to be known, AfE comprehends the future as an exploratory space – and since these approaches rely on fundamentally distinctive conceptions of future, the distinction cannot be countered at the level of knowledge alone, but requires an ontological shift (Miller, 2018). It concerns what form of future is being brought into the present and how choice structures what can be imagined, sensed, or questioned.

In conclusion, being able to differentiate between the two futures i.e., AfF and AfE, becoming aware of existing future assumptions, and embracing novelty takes one on the path of futures literacy. The practice of FL liberates our imagination and helps us to see the present more clearly.

2.2.4 Characteristics of futures literacy

There are several significant challenges or characteristics of FL (Miller, 2018). FL is a tentative and constructive capability. This can be understood through a symbolism of a flowing river – someone

trying to draw the river while the river still flows and changes the direction. Therefore, FL can be understood as something that is already what people do, what people change while doing it, and something which reshapes itself through practice. Another characteristic of FL is that it is reflexive. Practicing FL changes the way someone uses the future, and this new way changes their behaviour. In this way, an individual's way of using the future could be redefined and reinvented, posing a challenge that someone who does not involve in this process would remain futures illiterate (Miller, 2018).

2.2.5 Futures Literacy Laboratory (FLL)

UNESCO was a site in which FLLs were developed as a method which focused on surfacing different assumptions as a starting point for acting in the present, called futures literacy knowledge labs (discussed in the methodology chapter). FLLs create a structured setting to surface and challenge participants' anticipatory assumptions to open up new ways of framing trivial contemporary concerns (UNESCO, 2014), providing a suitable context for examining the processes of anticipation and its operationalisation.

Building on three pillars i.e., narrative, collective intelligence, and reframing, FLL helps individuals to create stories or frameworks which assists them to make sense of situations, share perspectives in a collaborative setting, and question the existing assumptions to change how situation is understood. Similarly, its goal is to begin from a familiar place of certitude, turned into a shared space of accepting ignorance, to then learn how to engage with novelty in the present. Through playing with different futures, individuals embrace complexity as they recognise existence of diverse assumptions and engage in shared meaning-making rather than seeking a single deterministic outcome (Miller, 2010).

2.3 Semiotics

Semiotics, in its simple terms, refers to the *study of signs* (Chandler, 2022). There is no easy way to facilitate the understanding of semiotics. Chandler puts it in a way that, if you ask an assistant at a bookstore to help you find a book on semiotics, they might look at you with a blank look. It becomes more challenging when one introduces Semiotics as 'the study of signs.' The immediate followed question would be, 'What do you mean by a sign?' For a beginner, this can lead to a sense of regret in having introduced the field with only limited foundational understanding. The first assumption that might arise in their mind would be what we usually refer to as 'signs', like road signs, warning signs, and star signs etc. But semiotics is all of these and much more, and if you

refer to all kind of signs including these signs which are usually in the visual form – but visuals could also be anything, from drawing to photographs to paintings – so they might direct you to the art section. Chandler humorously puts it that if you keep on adding to the list of signs, stating that words, language, and sounds could also be a sign, they might have already ‘read the sign’ which suggests that you are either insane or strange (Chandler, 2022.).

So, what is a sign? A sign is something which stands for something beyond itself. It can be in any form – an image, a word, an odour, a sound, an action, an object, and the list goes on. Anything which is potentially interpretable is a sign; and in every situation in which humans perceive something and interpret the perception, they use a sign (Siivonen, 2007). Humans, among all other species, are above all meaning-makers, bound to find a meaning in everything. They recognize conventional symbols as well as natural signs, like a symbol of a flag, and yellow leaves signalling to the arrival of autumn – everything carries a meaning and thus we are surrounded by a web of signs. Semiotics as a study of signs refers to how meanings emerge and how reality is represented or constructed through “signs, sign systems, and process of signification” (Chandler, 2022.).

Charles Sanders Peirce and Ferdinand de Saussure are considered to be the co-founders of semiotics. Peirce defined semiotics as “an action, an influence, which is, or involves, a cooperation of three subjects, such as a representamen (simply a sign), its object and its interpretant” (Eco, 1979; Merrell, 1995), represented in Figure 1. Furthermore, a sign can be an icon, indices, or a symbol, as shown in Figure 2. Meanwhile Saussure defined sign as a unity between signifier i.e., words and shapes, and signified i.e., what the sign is supposed to mean (Nadin, 2022).

Semiotics incorporates the philosophical inquiry into representation and reality (Chandler, 2022). Rather than supposing that signs reflect the objective world, semiotics argue that meaning does not reside in representations inherently. A meaning appears when a person connects the sign to something in their mind, that determines what it refers to (Aristotle, 350 AD). When a person encounters something unfamiliar, they search and formulate in their thoughts an interpretant which helps them organise perception and make sense of what is being encountered (Deely, 1990). It does not stop here, it generates new interpretants e.g., there is a smoke so “there is a fire”, the next thought would be that “fire would spread”, followed by “I should leave this place”. The series of interpretations continues. There can also be a point of reinterpreting one’s own interpretation e.g., “that might not be a fire, that could have been fog.” These experiences also help a person to pass on information concerning the perception to someone else (Deely, 1994). This concept will be further developed and supported by examples in the discussion section.

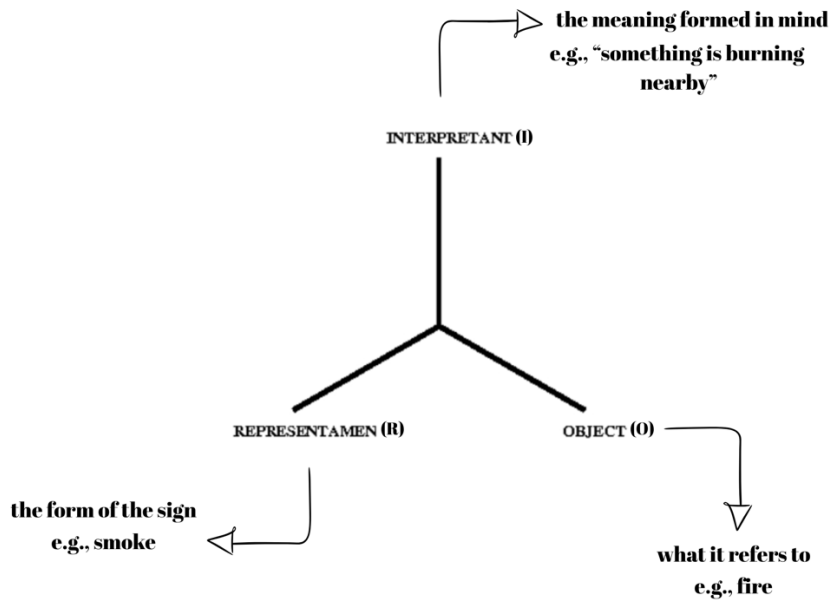


Figure 1. An illustration of Charles S. Peirce's triadic model of a sign

Apart from one's own awareness or understanding of a sign, there are also some relational processes involved in meaning making. Such as, cultural and situational contexts (Siivonen, 2007), which influence the interpretant (or a meaning) associated with a representamen (or a sign) – making it impossible to think of reality as something that is independent of these influences. Interpretations also differ with reference to past experiences (Kristeva, 1986). Beside cultural, social and historical aspects, human cognition and memory storage also comes into play when interpreting a sign and further directs their action. In this sense, human's "memory functions not as passive storage but as an imaginative reconstruction oriented toward future action" (Gentile, 2025). One can "become more aware of the roles that subjectivity, interpretation and cultural context play in shaping the way we understand and create the future" (Riedy, 2008). There is an additional influence of the possible future in one's interpretation as well (Nadin, 2022), which will be discussed in the next section and is the core of the research. Such amalgam of interpretations and influences in meaning making brings into focus the mediating role of signs, and the roles played by ourselves and others in constituting social realities and imagined futures.

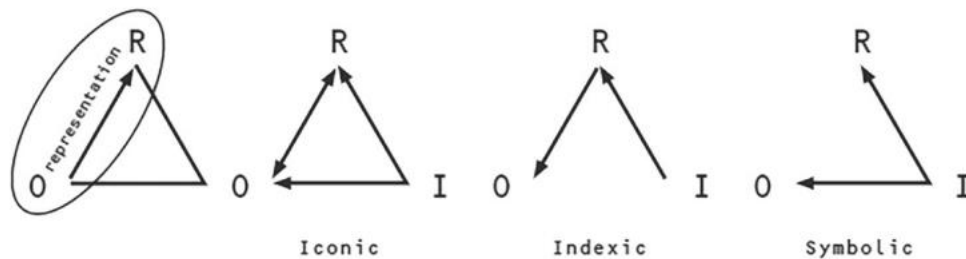


Figure 2. Forms of representation (Nadin, 2022)

An object can be represented: Iconically – represented based on likeness, indexically – representation causally influenced by the object, and symbolically – representation based on convention.

2.3.1 Semiotics and anticipation

Producing a sheer volume of literature on understanding the interrelation between semiotics and anticipation, Mihai Nadin proposes that humans do not operate on objects directly instead through the representations of them (Staff, 2004). For instance, when thinking of an ice on the ground, one does not directly process the object itself, but forms a representation of it i.e., its surface. This creates a second version of reality, which is not physical but virtual, constructed, and meaningful. Hence, the action is guided by this representation which one creates, i.e., slippery surface, followed by the action of walking carefully or wearing spiked boots to avoid the fall. Nadin argues that semiotics is reduced to meaning making, however, it holds the potential to address where does this lead to, or simply, how meaning is related to the future. The future enters the present through representations (signs) of the not yet, he goes to the extent of claiming that in the absence of representation, the future could not be expressed (Nadin, 2014).

“The subject of semiotics is meaning” – human brain and cells do not communicate in numbers, instead, “one cell evaluates the other from a viewpoint of the meaning” (Nadin, 2017). Initially developed by John Deely, Nadin (2022) uses the term “semiotic animals” (*zōon semiotikon*) for humans, as they use signs to construct meanings and orient their actions toward the possible futures. Other living creatures also express the anticipatory nature of life. For instance, a beaver does not build a den in reaction to danger, but in anticipation of change, such as protection, survival, or reproduction etc. Nadin stresses on a few overlapping aspects related to anticipation and semiotics: (1) *meaning is tied to action* – for instance, a hammer is useful not only because of its shape, but the meaning (usefulness) attached to it, hence the meaning given to it defines ones action, (2) *semiosis is temporal* – meaning making is always oriented toward possible futures than solely past causes, (3) *Knowledge is future oriented* – humans do not solely possess knowledge because of the past but for future use (Nadin, 2016), and (4) *semiotics is non-deterministic* – the same sign can lead to multiple meanings, and “semiotics has nothing to contribute to the determinism of predictive mechanism” (Nadin, 2022). This is because unlike prediction which relies on physical causality (same cause, same effect), semiotics deals with interpretation, meaning and free human action which cannot be determined. Acknowledging multiple futures, he claims, “we refer to possible futures – plural! ... possibilities” (Nadin, 2014). Semiotic awareness, or knowing what we know, although not possible to know everything, is nothing other than the realization that acting upon representations improves the outcome of human action, while generating new representations

through the process of knowing. Leveraging on the above insights, “there is no way to acquire, store, and disseminate knowledge other than semiotically”, and “future is made part of the present via semiotic processes” (Nadin, 2014).

Additionally, Pärn (2021), in her article, concentrates on anticipation as an activity based on semiotic mediation and suggests that future exists as semiotic constructions – created, shared, and mediated through signs. She further stated that anticipation is not just an expectation, it is model building i.e., creates *models* of possible futures, and these futures are shaped not just in mind but in interaction. Futures are constructed and negotiated combining affective states, like fear and hope, with cognitive models. These approaches justify why interaction, interpretation, and meaning making matter in studying anticipation. Kuusi and Hiltunen (2007) refer to the term *future sign*, iterating that the sign itself is not the future, however it refers to the future through meaningful interpretations. Gentile (2025) studied anticipation as a fundamental cognitive and semiotic process through which individuals construct meaning and interpret the world.

Drawing on these contributions, anticipation can be understood as inseparable from semiotics as individuals are constantly in the process of meaning making which shapes their anticipatory assumptions, perception, and present actions. Therefore, meaning attached with a sign, symbol, and representations actively shape one’s future orientations and imaginaries and can also be reflected through how they interpret signs, individually or collectively.

2.4 Visual signs as semiotics sites

Visuals are ambiguous in nature. This ambiguity can occur due to one’s perception, interpretation, external influence, or other factors like memory, culture, and background (Eppler et al., 2008). Visuals can serve as a translation and transformation device, called as a boundary object, and such objects have considerable *interpretive flexibility* (Star and Griesemer, 1989). This inherent nature enables visual interpretation to reveal new insights, reframe issues, facilitate discoveries, or stimulate groups sense making. Humans use signs to construct meanings and orient actions toward possible futures (Nadin, 2014). Moreover, visual possess distinctive features. Some of these features are linked with memory storage i.e., the nature of the memory is visual and emotional (Chun and Jiang, 1998), and the basic mechanism of our brain for making sense is the so called “picture-superiority effect” (Weldon and Bellinger, 1997). Moreover, “the imagery system [of our brains] is activated more directly by perceptual objects and pictures than by linguistic stimuli”, and humans react faster toward pictures than to words (Paivio, 1975). These biological responses to visuals

along with memory's characteristic to create meaning and perform associations without our intention places visuals as core factors in shaping perceptions and assumptions.

Signs are alive (Nadin, 2014). There is no inherent meaning in signs which renders them open to diverse interpretations. Visual signs similarly act as sites of meaning making, where interpretations keep the meaning in flux. According to Wittgenstein, people do not simply register what they see, they perceive it as *something*, through an interpretative way of seeing – simply put, interpretation is already part of seeing. For instance, a triangle can be seen as a mountain, a geometric figure, an arrow, or a fallen object not because the meaning is contained in the triangle, but it is how one perceives and interprets it (Futrelle, 1999; Wittgenstein, 1989). Nonetheless, giving the example of famous duck-rabbit picture derived from Jastrow (1901), shown in Figure 3, Wittgenstein argues that after ‘continuously seeing’ the picture, one might first see a duck, followed by a realization that it is a rabbit, or vice versa. He further says, “I observe a face, and then suddenly notice its likeness to another. I see that it has not changed; and yet I see it differently” (Wittgenstein, 1989). Wittgenstein questions if it is the image, the eyes, or the mind which changed, and concludes that our perception is tied to interpretation, such that perception is “half visual experience, half (expressions of) thought” (Wittgenstein, 1989).

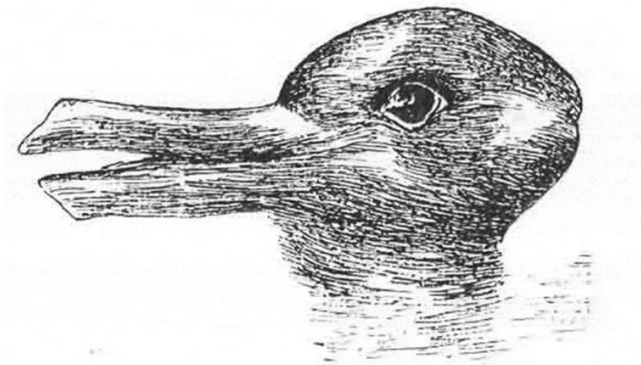


Figure 3. Duck-rabbit illusion (Jastrow, 1899)

A special feature of visuals is their ambiguity or their quality to be open to various interpretations. While verbal ambiguity has received considerable attention in research and is vastly used on purpose to trigger certain effects in an audience i.e., rhetoric or poetry, the same does not hold true to visual ambiguity. However, literature shows the research on visual ambiguity from a single viewer perspective predominantly; it can also be fruitful during a group collaboration (Eppler et al., 2008). Moreover, visuals are often analysed in terms of its negative effects, such as imprecise results (D’Ulizia et al., 2007). Barthes (1977), in his semiotic analysis of the rhetoric of images,

suggests that images are polysemic and imply a “floating chain” of meaning across different layers: denotation (what we literally see), connotation (cultural or symbolic meanings), anchorage (text or context guiding interpretation), and relay (image and text interact to produce meaning). This visual in its ambiguity “becomes more of an abstraction, an available site for the attachment of multiple connotations serviceable in multiple contexts” (Edwards and Winkler, 1997). Additionally, visual ambiguity offers the potential to surface new insights, reframe issues, facilitate discoveries, enhance identification, and stimulate group sense making (Eppler et al., 2008).

Taken together, visual ambiguity is taken as a productive condition for interpretive plurality, and not a limitation. The openness of visual signs render them useful for generating multiple interpretations and surfacing future orientations, and particularly, making them relevant to explore connection between semiotics and anticipation.

2.4.1 Role of visuals in futures-oriented settings

According to Arnheim, language is not the only vehicle for thought, visuals are the structured tools which also lead to thinking, which he termed as visual thinking (Arnheim, 1969). This potential of visuals has been recognized by several disciplines other than arts. Such that futures-oriented settings have evolved in many aspects, paralleling a social turn towards arts (Bishop, 2006), and socially engaging arts practices in non-arts context (Huss, 2022). Many scholars have explored the potential of creative arts in futures-oriented settings (Candy, 2010; Gannon and Naidoo, 2020; Lyon and Carabelli, 2016; Mullooly, 2022). However, the integration of these approaches remains relatively limited and scarce. Some visual practices have long been used and supported in such settings for several reasons; a few will be discussed in this section.

Lehikoinen integrates art-based visual methods, including visual arts, literary arts, music, film, and performing arts, in futures workshops to surface hidden assumptions, enhance futures consciousness, and enable collective interpretation of alternative futures by materialising anticipatory imaginaries (Lehikoinen and Tuittila, 2024). These approaches helped to enhance observational abilities, innovation processes, and creative thinking (Lehikoinen and Siljamäki, 2023).

In an article by Karaiskou, visual literacy is attributed to enriching the field of anticipatory assumptions and futures literacy (Karaiskou, 2024). The author discusses Panofsky’s three levels of art analysis, namely pre-iconographic description, iconographic analysis, and iconological analysis (Panofsky, 1939). The three analytical approaches refer to understanding visuals on three different

levels: its immediate visual appearance, the conventional meanings it conveys requiring some knowledge of the cultural or historical background, and the deeper understanding of beliefs, ideology, values or symbolic codes embedded in it (Panofsky, 1955). Within this context, visual literacy enables one to move through these levels and informs that images are the carrier of meanings. Abas attempted to develop “visual literacy skills in terms of generating interpretations and translating visual-to-verbal for meaning-making” (Abas, 2019). Karaiskou however analyses the deeper layer associated with the use of visuals (including photography, monuments, and heritage places etc.) in futures literacy by unravelling the origin of one’s perceptions, memory mechanisms, ramifications with cultural frameworks, and their convergence to define our assumptions and anticipation (Karaiskou, 2024.). It can also be stated that our interpretative frameworks exist in the past (Karaiskou, 2022) and the recognition of interpretive filters we carry inevitably bring awareness of their effect on our thinking and anticipatory patterns. However, these influences remain undiscussed in this thesis.

The core concepts throughout this chapter assisted in understanding and positioning anticipation and semiotics at the core of this research. Anticipation is understood not as a distant orientation toward what is yet to come, but as a present-centred process through which future can be made a part of the present. Moreover, anticipatory process is deemed inseparable from the process of semiotics, as future enters the present through representations or sign interpretations of the not yet. In this context, semiotics offers a complimentary lens for understanding how anticipatory assumptions become visible, shareable, and negotiable. To study the two concepts collectively, FLL is chosen as a suitable open space. Furthermore, the theoretical discussion on visuals ambiguity and interpretive plurality render visual signs as an ideal semiotic site for meaning making and collective mediation. Most importantly, they suggest that meaning does not reside inherently in signs, but emerges through process of interaction, interpretation, and reinterpretation. The study approaches this ambiguity as a productive space where anticipatory process can be studied and analysed.

3 Methodology

This research approaches the study of anticipatory processes through the lens of semiosis, by employing visual signs as empirical entry points in an established method of futures literacy – namely FLL. Specifically, it explores how drawing visual signs individually and interpreting them collectively can help to materialise and surface one’s anticipatory assumptions, and further, how co-creating visual signs and interpreting them simultaneously can assist in expanding one’s anticipatory frames or influence AA in some other way. Emphasizing on the process of meaning making, the research pins on analysing the meanings and not visuals themselves. Hence, to focus on the emergence and evolution of meanings attached to the visuals, the study adopts a process-oriented semiotic approach and aims to investigate how anticipatory assumptions are articulated, interpreted, and reconfigured in interaction. FLL provides a suitable empirical setting for this exploration as it is designed to surface and challenge the embedded anticipatory assumptions. Across several phases of FLL, the interrelation between semiotics and anticipation is observed in practice, shifting the focus from the content of imagined futures to the processes through which AA are expressed and transformed. Within this context, visual signs are treated as semiotic sites through which participants assign, interpret and reinterpret meanings about probable, preferable, and reframed futures, and embrace uncertainty in the present.

This chapter outlines the methodological approach adopted in the present study. The first subchapter establishes rationale for employing visual signs to mediate anticipatory processes. This is followed by the second and third subchapters which clarify the role of FLL in the overall inquiry and situate the study within two FLLs to reflect on research setting and design. The subsequent subchapter presents the data collection sources. The chapter concludes with a reflection on complementary qualitative and process-oriented approaches grounded in semiotic analysis.

3.1 Visuals as empirical entry points

Visuals were employed in this research as methodological entry points for initiating a semiotic process and examine anticipatory assumptions within a FLL setting. The selection of particularly ‘visual’ signs, among other signs such as words and actions etc., was informed by versatile characteristics of visuals i.e., open to multiple interpretations, enable several meanings and associations through drawing and interpretation, and orient beyond the immediate present. In this research, visuals functioned as facilitators of expressions, sites for meaning making, and enablers of meticulously observing semiotic and anticipatory processes. Visual representations are placed in the

study also as an experimental tool, such that, the research begins with testing a tool while studying the underlying phenomenon simultaneously. They were not treated as mere outputs to be analysed, rather the research approached them as mediating devices through which semiosis could be empirically observed.

Visuals were operationalised within the FLL setting. Visuals signs were created across individual and collective drawing activities. This points to the view that drawings were created by the participants themselves. This is because, art as a process facilitates the expression (Dewey, 1934). Visual creation acts as a cognitive tool and makes implicit contents of mind visible (Fan et al., 2023; Weng et al., 2024). In the first phase of FLL, the drawings were produced individually without any external interference and later interpreted individually by every participant. This was carried out to bring forth individual representations of imagined probable and preferable futures and AA, and to minimize bias emerging from the influence of other's interpretations. The visual signs remained static while interpretations extended through group interaction. In the second phase, participants engaged in the collective sign creation in response to a reframed future scenario. At this stage, visual signs did not remain static and developed in response to the ongoing group interaction and interpretation of previous signs. Therefore, both the signs and the meaning evolved simultaneously enriching the process. This enabled the study to observe semiosis throughout the process of sign creation and interpretation.

Although several futures methods are designed to surface AA and enhance one's capacity to step beyond their limitations and to approach them at a "deeper level" (Inayatullah, 1990) using methodological tools within, like Causal Layered Analysis (CLA) developed by Sohail Inayatullah (Kazemier et al., 2021a). This study brought forth an alternative way of revealing, articulating and reconfiguring one's AA by placing hand-drawn visuals as a tool to mediate anticipatory processes through semiosis. Furthermore, as 'language is the interpreting system of all other systems, linguistic and non-linguistic' (Benveniste, 1939), this study used language to articulate what had been observed in the visual representations. However, the language was not treated as an object of semiotic analysis itself.

The research conducted two FLLs to prototype visuals. The first lab design explored visuals in an untheorized setting, maintaining the focus on how visuals can be incorporated in futures-oriented setting, and how it facilitates expression of future assumptions. The observations made during this experiment informed the refinement of the second iterative lab. This lab theorized the visuals by placing them in a semiotic setting. The two lab designs are fully explained in the subsection 3.3.

3.2 Futures Literacy Lab methodology

Humans do not lack ideas or assumptions, sometimes they lack means to access, express, and shape them. The avenue for such a space, along with the methodological grounding of this thesis, is explained through the following example. The two thought experiments give an overview of what FLL is and what it does. The first experiment points to the notion that if you do not understand something, you dismiss it, like an old friend telling you about the presence of immense resources all around you which are invisible to you. It might sound crazy, so you dismiss it. The second thought experiment points to the possibility of getting access to those resources only if you possess the skill to read. So, the resource is there, but you need a skill to access it (Miller, 2015.). Given the example of microscope, it took 200 years to understand its significance, manifesting that there are forms of insight or knowledge that remain inaccessible until certain means are developed to perceive and make sense of them. KnowLabs, a tool called collective intelligence knowledge creation processes, tap into the knowledge of a specific group of people at a specific place and time, and surface unarticulated and tacit thoughts together with the facility to invent and negotiate meaning and variables. FLLs follow the same procedure, they do not only produce structured knowledge but assist people to access and make sense of hidden knowledge and assumptions, and observe novelty (Miller, 2015.).

Futures Literacy Labs are one of the futures interventions (Bergheim, 2022). Anticipatory assumptions are the building blocks of our imagination and the anticipatory models and the core unit of analysis in the FLLs. FLLs are put in the same group as Causal Layered Analysis (CLA), visioning, and participatory methods (Aaltonen, 2009). The labs are focused on discovering and inventing anticipatory assumptions, and they enhance the sophistication of our anticipatory systems (Miller, 2010). FLLs explore our assumptions that underly our anticipations by rendering them from invisible and tacit, to visible and explicit. It enables participants to comprehend how the way they anticipate alters the way they think and act in the present, and vice versa, how their feeling, thinking, and acting in the present reveals how they anticipate. The whole process in FLL focuses “specifically on unpacking and acknowledging anticipatory assumptions, and on reframing concepts” (Karaiskou, 2024.). It makes our brain acknowledge its power to reveal, redefine and reframe anticipatory patterns and eventually step beyond them to enrichen our present.

While FLLs are often framed as spaces for developing futures-oriented capabilities or competences and informing present action, this study engages with FLL from a different standpoint. The selection of this methodology is not rooted in its pedagogical outcomes, but in its capacity to render

anticipatory processes noticeable in practice. The emphasis of FLLs on participatory or collective action makes it suitable for this study, as the process in this study i.e., semiosis, is traceable when a group of people unite, share, and negotiate their anticipatory assumptions. FLL therefore creates a setting which encourages participants to surface, question, and at times, expand their assumptions through collective engagement. It encourages participants to comprehend *how* they think and *what* their AA are (Karaiskou, 2024). In this research, FLL not merely provides a facilitative setting in which latent and implicit dimensions of thinking can be surfaced, but also a structured and open setting where they can be collectively examined and the underlying phenomenon can be studied. This orientation also separates it from more conventional futures workshops, which tend to prioritize outputs over the processes of meaning formation that this study places at its core. Following are the four phases of FLL (UNESCO, 2023):

Reveal – In this phase, participants reveal their probable and preferable futures about a selected or a given topic. The aim is to discuss futures in a way that is often familiar, revealing our most thought-of futures.

Reframe – This phase is intended to increase one’s futures literacy as it fights the “poverty of the imagination” (Feukeu, 2025). It is not a standalone activity rather a part of a learning process and requires a collective. Engaging in an alternative storytelling about the future is at the core of FL which abolishes predictabilities (Kazemier et al., 2021b; Miller, 2015).

Reflect – This phase brings participants not only back to the present but also wishes them to see how they perceive the present now. It incorporates new questions and insights which emerged through getting involved in alternative futures and exploration of multiple temporalities.

Next steps / invent – The phase requires participants to recognize the steps they wish to take together over a span of a month, six months, a year, or two years. This step comprises of enlisting their commitments they make to themselves and their community.

In conclusion, within the FLL context, visual drawings are used as heuristics i.e., a tool for thinking – and mediating semiotic devices. Participants are invited to make their anticipation explicit through the expression of drawing. The rationale is based not on the assumption that visuals are inherently superior in any way to the language, but on the premise that visual signs operate differently semiotically. The exploratory intent behind visual drawings serves as the basis for FLL I. It assumes that drawings often introduce fragmentation, ambiguity, and interpretive openness. These

characteristics make it feasible to notice how meaning is constructed, expanded, and transformed when interpreted by others.

3.3 Two iterative FLLs: Exploration to semiotic focus

3.3.1 Lab setting

The study organized two Futures Literacy Labs, both of differing epistemic purpose and duration but similar heuristics, or in this paper termed as entry points, i.e., hand drawn visuals. The first lab was conducted to explore the potential and practicality of using visuals in anticipatory processes, while the second lab examined the underlying processes through which visuals shape anticipatory assumptions. Both labs served distinct roles, which clarified their relevance and contribution to the study. The findings of first exploratory lab laid the foundation for and informed the refinement of the second process-oriented lab. Although the first lab was not recorded and therefore not subjected to a detailed analysis, it provided insight into the underlying processes – which were observed more closely in the second lab. As the subsequent lab systematically documented the content and analysed it in depth, it forms the empirical core of this study. Both labs aligned with the core principles of futures literacy as they presented conditions in which participants revealed, acknowledged and shaped their anticipatory assumptions through visual sign making and sign interpretation.

Lab I – Exploratory setting

The first futures literacy lab conducted to explore the potential of hand drawn visuals took place in autumn at Villa Tammekann in Tartu, Estonia. The lab was organised during a retreat funded by the Turku University Foundation (Turun yliopistosäätiö) allocated under Granö stipendium for the Futures Literacy research group. As retreat provided sufficient time to test the visuals, the lab extended over the period of four days. There were total four individuals, two participants, a host, and myself acting as a co-host, all taking part in the lab activities as participants. All participants were from futures studies background, with differing expertise levels in the field of futures literacy. I personally took part in the lab as I wanted to position myself in place of a participant, which would enable me to modify the lab design as per the requirements and suitability of the current research design. As the researcher was involved in the experimental development and the co-facilitation of the lab, the researcher was not positioned as a detached observer outside of the process. This reduced the likelihood of biasness in the research process. Moreover, participants were made aware that the lab design is formed as part of exploratory methodological setting.

The topic of the lab was cocreated by all four participants, i.e., “Futures of us taking a futures literacy approach in 2035” – which was directed toward the participants themselves so that they could leave the retreat with insights to carry into their present actions. For the same reason, the content of the futures remains undiscussed in this study, while steering the entire concentration toward prototyping visual tools and understanding the rooted phenomenon. Forging ahead, different settings were explored during the lab to contribute to the productivity of the participants, ranging from a basement room near the sauna to the park leading to Song Pavilion. As aforementioned, the lab spanned four consecutive days, with each day dedicated to a specific phase of the lab, i.e., Reveal, Reframe, Reflect, and Invent. The instructions of the lab, given by the host, were based on the guide presented by UNESCO (2023) futures literacy and foresight team, while the co-host (myself) developed and guided the visual exercises, adapting the facilitation according to the progression of each step.

As the first lab focused on testing and making visual methods into viable exercises in FLL, the content and discussion remained unrecorded, creating space for subsequent iterative lab. The elements relevant to understanding the role of visuals were exclusively extracted. A key insight emerged from this experience that the articulation and expansion of anticipatory assumptions appeared to be closely tied to how visual signs created during the exercises were interpreted and reinterpreted. Recognizing this prompted the development of the second lab aimed at observing the meaning-making around these signs thoroughly.

Lab II - Theoretical observation

The second lab was organised in spring at Teutori library in University of Turku. The objective of this lab was to repeat the process established in the previous lab while approaching it from a more focused perspective. Whereas the earlier lab explored how visual signs could mediate anticipation, the present iteration sought to concentrate more closely on the process that makes such mediation possible.

The topic of the lab centred around friendship, i.e., “Futures of forming friendship in 2040,” and was influenced by both its relevance to the participants and my personal experience as an international student. Studying and living in a foreign country often brings questions of connection, belonging, and social support to the forefront almost in everyday life. Besides other concerns, students are sometimes unconsciously anticipating on the subject of friendship. The topic was selected to bring forth participants’ hidden assumptions and provide a relatable and engaging starting point for reflecting on future possibilities.

A total of four participants, all (international) master's students, took part in the lab, including two from futures studies and two from natural sciences – all having little to no knowledge about futures literacy. The reason behind inviting students from two different fields, additionally of different cultural backgrounds, based on the idea of bringing together different orientations toward thinking the future. This combination of varied disciplinary and cultural backgrounds created a setting where different ways of visualising the future could appear. Despite the relevance cultural and disciplinary backgrounds in invoking rich discussion and unique sign making, their influence on interpretation was beyond the scope of this study and therefore not analysed. Moreover, choosing a smaller number of participants was intentional due to the time constraints of the session, which lasted approximately three hours. Additionally, some of the exercises required participants to work individually and sequentially, with each participant carrying out the task in turn – requiring more space and time.

Furthermore, the lab design was adjusted by reducing it to complete the first two phases of the lab i.e., reveal and reframe. However, after the lab session ended, participants began reflecting on their journey to conclude the session and share their experiences, but the fully designed reflection phase was conducted separately over a two-week period through an online form (attached in appendices), enabling participants to reflect on their learning experience as well as on easiness to visualise their thoughts. The interaction and discussion among the participants were systematically recorded in order to support a detailed analysis of the meaning-making process observed during the lab. In this way, the successive adaptive design enabled the exploratory insight from the former lab to be followed by a more empirically grounded examination of the underlying phenomenon.

3.3.2 Lab design

The design and sequence of activities of the two labs remained similar, however a few adjustments were made to fit the requirements of the research. Some minor differences between the two lab designs including the number of phases, duration of the sessions, and the format of the reflection phase, are detailed in the sections below as the structure of the phases of the FLL unfold.

Phase I – Reveal

In phase I, the visual exercise was designed to facilitate individual reflections on the topic through hand-drawn illustrations. The instructions were to draw the future of the lab's topic silently for 10 to 15 minutes. In the first lab, participants decided to draw, both, probable and preferable futures submerged into a same illustration, while the participants of the second lab decided to partition the

two kinds of futures as suited their preference. Moreover, visuals were created by the participants individually to externalize their anticipatory assumptions without any external influence and to translate these assumptions into visible forms as their thoughts progressed. The aim was to bring forth diverse future images rather than to converge early on shared future assumptions.

The next steps were to write their assumptions – or in this research they are also termed as the *meanings* assigned to each visual sign present in their drawing – on a piece of paper. As the prototype lab evolved responsively during the session, the assumptions were written on a plain sheet, while for the second lab, a table was pre-designed which included columns, namely ‘drawing illustrator’, ‘sign’ and ‘meaning’, to be filled by the participants. This step was carried out for another 15 to 20 minutes. Participants were instructed to fill the first row of the table firstly by mentioning the signs they created and then the underlying meaning behind that sign. After the task was completed, they were guided to display all the drawings and circulate them among participants in a way that each participant has one drawing at a time which is made by another participant. The purpose was to observe the signs produced by others, reinterpret them in the context of the lab’s topic, and write them in the rows below. This step was solely intended to avoid potential bias, as the actual explanation from the original illustrator could inadvertently influence others’ perceptions or meaning making. The same process was repeated until every participant had reinterpreted all the drawings.

After the writing phase, participants were given opportunity to share what they had written, while leaving their own drawings uninterpreted until the end. At the end of this phase, illustrators revealed the meanings initially attached with the signs they created. However, the meaning remained unfixed, where no assigned meaning was considered correct or wrong. As multiple anticipatory assumptions became explicit, the phase ended with a brief reflection on what seemed surprising and what aligned with the intended meaning of the probable and preferred futures.

Phase II – Reframe

In phase II, the focus was to discover the unfamiliar futures through a gradual journey towards anticipation inclusive of creative thinking, emergence, and novelty. A reframe model, in particular the Dynamic Reframe model (cant find the reference), was positioned between phase I and phase II to facilitate the transition toward an unconventional and uncomfortable scenario. The reframe model requires identification of the prominent anticipatory assumptions about the future that emerged in phase I (Feukeu, 2025). Its goal is to challenge our current assumptions, disrupt linear

thinking, and add some more sense to the existing frame regarding how the future could unfold from the present.

The reframed futures in the two iterative labs challenged the dominant assumptions of the participants which surfaced in the reveal phase amid sign interpretations. Concerning the first lab, a dominant assumption in each drawing was meticulously extracted, and the signs representing those assumptions were taken as metaphors, which formed the basis of the reframed future. Unlike in the first lab where the reframed future was developed by the host over the course of a day, it was preliminarily formulated in advance due to time constraints in the second lab. However, following phase I, the eminent anticipatory assumption was incorporated and adjusted accordingly.

The scenario was developed prior to the phase II based on guidelines from UNESCO playbook (2023) and a book chapter dedicated to reframing (Feukeu, 2025). The following was the resulting reframed future:

“We are still in 2040. Now imagine that something fundamental about human communication has changed. In this future, humanity has developed the ability to communicate without words at all. Spoken language slowly disappeared. Through presence and eye contact, people can directly perceive the subtle chemical and neurological changes occurring in another human’s brain. Every interaction allows you to register shifts in attention, intensity, and internal states. People do not just notice simple emotions like anger, calm, or happiness. Instead, they can sense the whole inner process of another person as it changes moment by moment. Because of this, words like trust, care, or support no longer make sense. People cannot translate these experiences into language anymore. The inner processes between two people are perceived directly. Nothing needs to be explained. Nothing needs to be declared. Nothing can really be hidden. We are now living in a world where all relationships happen without words. And this develops a new question. If you can directly perceive another person’s inner processes, if intentions and changes in the mind are constantly visible, then what does friendship even mean? Is friendship still about closeness? About choosing someone? About spending time together? Or does the idea of friendship itself change in a world where understanding happens continuously and instantly? In this future, draw what friendship forming could be like, if words, explanations, and declarations no longer exist.”

Proceeding forward in the second phase of FLL, the instructions unfolded in a quite opposite manner – collective drawing with a shared dialogue instead of individual drawing and solo interpretations. Each participant started with a small warm-up activity of freehand drawing on a large chart. As it progressed, the participants started illustrating the future assumptions while concurrently mentioning the reasoning behind their illustrations, or in this research they are termed as ‘*signs*.’ Participants were instructed to share what they drew as well as the meanings assigned to

the signs they drew. Furthermore, they were encouraged to build on each other's ideas in collaboration which led to a coherent storyline. The idea was inspired by the improv "yes-and" as a form of generative dialogue which creates a space for multiple viewpoints to co-exist and build on each other (Kahane, 2017). The core idea of such dialog is – "yes" – to acknowledge the other person's idea and – "and" – to add your own perspective to it. The intersection of diverging ideas gave rise to the alternative future trajectories and unfolded a chain of sign interpretation and expansion. Many novel components and new configuration of ideas emerged in this phase, signalling a shift in anticipation. Along with the discussions, participants wrote post-it notes to remember what they had discussed and to reflect on them in the later phase/s.

Phase III – Reflect

Phase III marked a deliberate shift away from drawing toward a reflective exchange on the insights and experiences from the previous phases. It focused on consolidating the process rather than creating further visual artefacts. The format of this phase differed between the two labs.

In the exploratory lab, participants mutually decided to continue in an outdoor space to reflect upon two things: what did they notice with their experiences in phase I and phase II, and what new insights and questions did they have about the lab's topic. Participants were divided into two groups and invited to walk along separate paths in a park, allowing reflection to unfold through informal conversation and movement. The groups later convened in a shared space i.e., Song Pavilion, to share what they had discussed with their pair. While the lab addressed a substantive futures-related topic i.e., futures of us taking the futures literacy approach, the analytical focus of the research during this phase remained on the role of hand-drawn visuals within an FLL. Visuals did not remain as finished outputs but stayed active throughout the conversation. After the reflection on the topic's content, each participant was asked to express how visual engagement supported their articulation of ideas, creative thinking, and the exploration of diverse understandings.

In the iterative lab, participants were provided with a follow-up form via email within a period of two weeks to reflect on their experience. The questions were tailored to meet the requirements of the research questions of this study which centred around exploring the role of visuals in mediating anticipatory processes at individual and collective levels. The reflection phase questions can be found in the appendices (Appendix 2).

The questions mainly included the comparison between the three alternative futures i.e., probable, preferable, and reframed and their influence in shaping participants' current perspectives,

participants awareness regarding their anticipation and shift in anticipation through sign interpretation and reinterpretation, and effect of other interpretations and meaning making during individual and shared drawing phases. Additionally, they were asked to reflect on their experience with conveying their thoughts through drawings and how it brought an element of surprise for them.

Phase IV – Invent

This phase of FLL was only conducted in the first lab because of the aforementioned reason – the participants could leave the retreat with insights to carry in their present. This phase aimed at providing final closure for the group as they translated their shared experiences into specified outcomes. Building on the preceding phases of individual and collective hand drawing as well as the reflective dialog, participants then focused on articulating inspirations for potential developments, actions, or resources related to the lab’s topic. This phase was oriented toward two levels of outcome-making: individual intentions related to participants’ varying levels of expertise and familiarity with the topic, and broader contributions to the overall development of the topic i.e., futures literacy.

Ideas were shared among the participants through post-it notes followed by brief explanations. The influence from the earlier phases of visual engagement remained evident throughout the discussion. The drawings which functioned as heuristic anchors continued to organise participants’ thoughts and moved them from imaginative exploration to actionable considerations. Finally, the prototype lab, with such transformative outcomes, proved to be a reflexive turning point toward semiotics, highlighting the depth and significance of using visual signs in an FLL setting.

3.3.3 Exploratory lab reflections

This reflection from the exploratory lab seeks to answer the question of viability of using visual drawing in a futures-oriented setting – specifically in a Futures Literacy Lab.

Based on my own observations and brief feedback from the peer participants, visual sign creation externalized and materialised the otherwise implicit anticipatory assumptions, making them available for further meaning making which shaped and expanded these assumptions. Participants, including myself, immediately started processing and translating the thoughts into visible forms. Such that, drawing helped bridge the gap between creative thinking and expression. Participants used different colours and pens, and most importantly, drew ‘abstract’ signs to reveal their anticipation. Through a rich discussion, recurring metaphors emerged functioning as shared reference points on the central insight of the topic that enabled further discussion. Some of the

strong metaphors which represented the futures literacy were sun heart, tree, ant hill, and doctor's hat. Other signs included cliff, fish, clouds, thunderbolt, and so on, all symbolising meanings other than what they stand for. These names were attributed by the illustrator, however, to align with the core of this research, these are considered as fluid names, as every participant interpreted it differently. The remaining signs are shown in Figure 4 and are open to interpretation by the reader. This showed that meanings were attributed to these signs based on one's own assumptions, and vice versa, signs acted as anchors for meaning.

When others interpreted the signs made by illustrator, the originally intended meanings were challenged. This positioned visual drawings as 'semiotic sites' where several meanings surrounded the same visual. Nonetheless, the phenomenon of semiotics remained undiscovered until the end of the lab. The polysemy of visuals ensured that anticipatory assumptions were revealed in the form of assigned meanings by all the participants, and that meaning emergence can lead to new ideas development, especially in the collective phase. In such manner, visuals fuelled continuation and extension of ideas, unfolding a 'semiotic chain' (will be discussed in the analysis chapter). However, the sign instability, interpretive plurality, visual interruption of habitual AfF, collective reinterpretation, and persistence of symbolic references throughout the lab were some of the indicators of success of visuals. It is important to acknowledge that the significance of visuals is not fixed in drawing itself, rather its revealed through interpretation, modification and dialogue, enabling shared meaning-making.



Figure 4. FLL 1 – Individual and collective drawings from phase I and phase II

After the lab concluded, the research took a turn – from exploring the role of visuals in mediating anticipatory processes to studying the process itself, to substantiate the role of visual signs in anticipatory processes, build a connection between semiosis and anticipation, and contribute to the

field of futures literacy. Observations and reflections from this lab pointed towards the ongoing process of meaning making which is conceptualized in this study as ‘semiosis’ and constitute a primary empirical basis for addressing the research questions through a second lab.

3.4 Data triangulation

The analysis draws on multiple data sources to understand the meaning making processes emerging from visual signs. These include participant-produced visual representations, written interpretations, and audio recordings of explanations. These recordings have been transcribed using UTU transcriber. The other data collection methods included field notes, photographs of drawings, and reflection statements by the participants – given the consent of the participants to use this data.

3.5 Data analysis

Before delving into the analytical strategy of the study, it is crucial to clarify that the unit of analysis is not visual sign itself, rather the *meanings* attributed to these signs by the respective participants. These meanings are analysed across individual and collective levels, while strictly adhering to the research questions. To address the questions, lab processes are analysed using qualitative semiotic and process-oriented approaches applied throughout the four stages of analysis. Through these approaches, the episodes of meaning making leading towards broadening of assumptions are comprehended.

3.5.1 Stages of analysis

The analytical process follows a staged progression, moving from the recognition of visual signs to the tracing of how meanings are produced, expanded, and connected to anticipatory assumptions. The *first* stage proceeded with cataloguing visual signs drawn by the participants. However, as mentioned earlier, they are not analysed as visual artifacts in isolation, but as anchors for meaning, thus, serving as necessary analytical preparation step that narrowed down to the unit of analysis.



Figure 5. The four stages of analysis

The *second* stage traces the meanings and their transformation across two levels. At individual level, meanings given by the participants to their own illustrations and the ones made by peer participants are analysed. The analysis is carried out based on the data extracted from three sources:

written descriptions, verbal explanations, and visual signs (anchors for tracing meaning). At collective level in the second phase of FLL, an ongoing process of sign creation, meaning making, (re)interpretation and extension arose. This phase is analysed based on audio recordings, post-it notes, and visual signs.

The *third* stage necessitated the observation of the underlying phenomenon of meaning making more closely. Observations are made during and after the lab and are supported by empirical data. Aimed at understanding the fluidity of meanings, the data unfolds a crucial process of semiosis. However, it is important to mention that the *interactional* dynamics among participants are examined merely to isolate moments where meaning shifts, uncertainty emerges, and new or extended interpretations attaches with the existing signs, and sometimes, leads to the emergence of new signs or ideas, and not for the sake of analysing interaction itself. It is treated as data which enables meaning and anticipatory shifts observable.

The *fourth* stage connects these meaning-making processes to anticipation. Instead of treating anticipation as something which visibly transforms from AfF to AfE, the analysis approaches it as something which is materialised, expressed, and shaped throughout the process. The indicators of anticipatory assumptions are identified through contemplating what and how participants articulate, interpret, reinterpret, and expand the signs and therefore their meanings. This stage particularly focuses on the reconfiguration of participants anticipatory assumptions amid interaction.

Table 2. The four stages of analysis

	Stages of analysis			
	Identify visual sign	Trace meaning	Observe semiosis	Connect to anticipation
Phase I	The signs created by the participants individually (phase I)	The intended meaning (at the time of creation) behind the individual drawing	The reinterpretation of each drawing (including their own) by individual participants sequentially	Revealing anticipatory assumptions of illustrator and interpreter
Phase II	The signs created by the participants collectively (phase II), sequentially or collaboratively	The intended meaning behind a sign made during collective drawing session	The (re)interpretation and expansion of a sign drawn during collective drawing	Shaping and expanding anticipatory assumptions of illustrator and interpreter

To address the research questions, two corresponding analytical approaches are employed: qualitative semiotic analysis, and process-oriented analysis, as shown in Figure 6. Both approaches are guided by a set of analytical sensitivities concerning theoretical framework of semiotics and anticipation. From a semiotics perspective, polysemy, meaning instability and extension, and

reinterpretation became the centre of attention. From the perspective of anticipation, participants expressed and reconfigured anticipatory assumptions amid the process of meaning-making were analysed, along with particular attention to projection, overlap, and uncertainty around imagined futures and emergence of new possibilities. These sensitivities are not portrayed as fixed coding categories but as directing orientations that shaped what was focused on in the data.

3.5.2 Qualitative semiotic analysis

A qualitative semiotic analysis was conducted to identify the underlying anticipatory assumptions (AA), as it enabled the tracing of how meanings were constructed and destabilized through various interpretations of visual signs. The analytical frame is applied from when the participants share their drawings with others and interpret drawings made by peers in a chronological order. The qualitative frame traces semiosis by allowing to examine moments where participants give their own object (reference to) and interpretant (meaning) to a given representamen (sign), while connecting the process with anticipation. The aim here is not to compare interpretations surrounding the same sign by different participants, but to categorize patterns such as projection, overlap, divergence and moment of uncertainty in futures meaning making – all guided by analytical sensitivities derived from the theoretical framework on semiotics and anticipation. To mark and identify these patterns, a set of analytical markers was developed including ~overlapping probable futures, *overlapping preferred futures, ^reading sign differently, **unmentioned by the illustrator but seen by the interpreter, –unmentioned by the interpreter, Xcould not understand the sign. These marks were not intended to quantify in numbers, but to render visible the movement where different or similar set of AA surface and the differences in futures thinking are highlighted. This analytical framework helped in analysing the RQ1 where visuals were tested to surface a wider range of AA in an FLL setting. the peer reinterpretations also create a semiotic chain, where meaning constantly remains in flux. This diversity is also triggered using different kinds of signs i.e., icon, index, and symbols, and the meanings to these signs are assigned according to the context, experience, or future usage.

3.5.3 Process-oriented semiotic analysis

This analytical frame traces a collective semiotic process in which visual signs do not remain static and evolve along interpretation, reinterpretation and expansion of a sign. It focuses on the emergence of new symbolic elements referring to the *not-yet* after uncertainty is injected via reframe model. Unlike individual drawing phase where different meanings were assigned based on static visual signs, the second phase is analysed based on how interpretation of a sign changes the sign itself and, vice versa, how changes in the sign alters its interpretation. The second phase

primarily emphasizes on process-oriented analysis to trace multiple meanings that emerge, their expansion, and idea development throughout the collective phase of drawing.

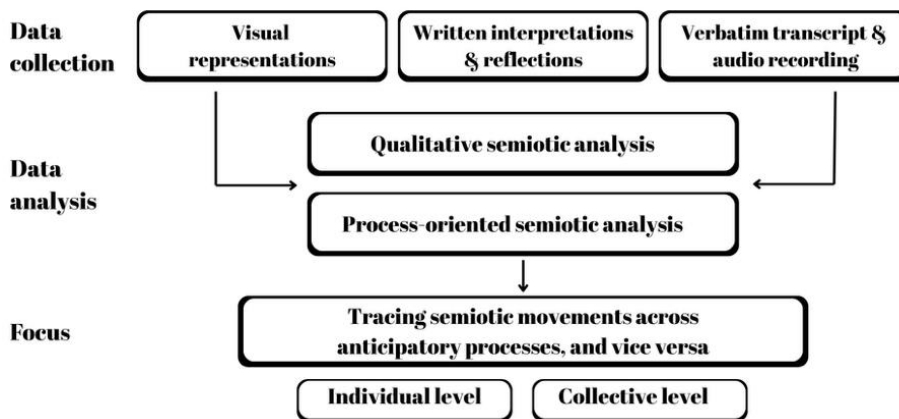


Figure 6. Analytical framework

Tracing semiotics, the analysis of the reframe phase falls into five categories: sign introduction, interpretation, reinterpretation, expansion (linkages), and anticipatory emergence from those signs (elaborated in the analysis chapter). It analyses how visuals act as stimuli to generate diverse and non-linear anticipatory frames. Like previous phase, the interaction among participants and visual signs themselves remain out of focus of the analysis but act as supporting evidence of meaning making. by doing so, the analysis focuses on how semiosis contributes to the expansion and shaping of anticipatory assumptions within a shared setting.

Selected verbatim excerpts are used throughout the analysis to preserve the authenticity of participants' expressions and tone, and to ground interpretation in their own meaning and language. The excerpts are not treated as isolated quotes but as situated instances which support the analytical claims. The analysis however does not produce a comprehensive thematic categorization but encodes meanings to organize and trace patterns in the data. The scope of the research remains deliberately narrow: how participants surface their AA through drawing, and how does it influence their assumptions in a collaborative and interpretive setting. Through the creative expression of drawing, this research does not claim to prove the thorough transition between anticipation-for-the-future and anticipation-for-emergence, rather stresses on the fluidity of meaning given to the visual signs which help individuals encounter other's interpretations and AA and become aware of and challenge their own AA.

4 Analysis

The following chapter is dedicated to analysing the data gathered through a trial run of the second futures literacy lab on the topic “Futures of forming friendship - 2040.” It addresses the content component of the FLL and answers the two research questions designed for this study. It outlines how visual signs, when used as empirical entry points, mediate the process of semiosis, revealing and reframing anticipatory assumptions of the participants when they engage individually and collectively with the three alternative futures i.e., probable, preferred, and reframed. For each future, visual signs are presented alongside meanings given by the participants, – both illustrators and interpreters. The semiotic movement is traced the three phases of FLL to mediate anticipatory processes.

To analyse the first phase of the lab – Reveal – the meanings emerging after the individually created visual representations are shared among participants’ group are traced. The qualitative and process-oriented approaches prevail to analyse, firstly the written, and later verbal interpretations formed subsequently. Although semiosis is always an ongoing process, the study captures instances where participants observe the signs, interpret others’ drawings, and reveal intended meanings behind their own creation – all pointing to the underlying anticipatory assumptions. The first subsection is dedicated to carry out the analysis by tracing the semiotic process as well as its mediatory effects on anticipatory processes in phase I of FLL.

In the second phase – Reframe – the analysis integrates excerpts collective throughout the collective drawing phase to understand the ongoing semiotic process from the very beginning of the phase when participants co-created, interpreted, reinterpreted, and extended visual signs, associated meanings, or ideas. Rather than treating group discussion as isolated quotation, it is structured into a coherent account that reflects how the process unfolded. Both approaches allow anticipatory assumptions embedded in the drawings to be represented while preserving the participants’ own ways of defining them. Following this, the analysis identifies and discusses how meaning shift influences the anticipatory processes of participants at individual and collective levels, focusing on the most prominent patterns and shared interpretations that emerged across participants, rather than cataloguing every possible assumption present in the data.

The third phase – Reflect – is organised through a follow-up form provided to the participants via email and is attached in Appendices 2. The answers gathered from the participants serve as supplementary qualitative material beside researcher’s own empirical analysis and are transparently

embedded within the findings of phase I and II to support researcher's claims, as well as in a separate following section. Participants' reflection is treated as a data in which participants themselves reflected on how becoming aware of their future assumptions and acknowledging the presence of diverse futures along with the futures imagined by other individuals, shaped their anticipatory assumptions and directed their present action. They also reflected on the use of visuals as a means of expressing their thoughts.

4.1 Anticipatory assumptions about the probable and preferable futures of friendship forming 2040

This section seeks to answer the RQ1: *How do hand-drawn visual signs render anticipatory assumptions visible within the methodological setting of Futures Literacy Labs, surfacing a wider range of assumptions?* This part analyses how participants encode meanings in visual signs materialising their anticipatory assumptions, how unfolding those meanings make their assumptions explicit, and how subsequent reinterpretations create a semiotic chain while destabilizing the meaning. The unit of analysis is not the drawings made by the participants, instead the *meanings* given to these drawings, either revealed through a written or verbal expression. Qualitative semiotic analysis and process-oriented approach was conducted to identify the underlying anticipatory assumptions (AA), as it enabled the tracing of how meanings were constructed and destabilized through various interpretations of visual signs. This section strictly adheres to exploring probable (expected) and preferred (desired) futures or the future images of the participants.

Creating visual signs which depict, first probable and second preferred, futures of forming friendship in 2040 was the first exercise of Phase I – Reveal. Based on the given prompt pertaining to the topic, participants individually developed a drawing inclusive of multiple signs, externalising their probable and preferred futures, as illustrated in Figure 7. A separate form was provided to the participants containing a table of three columns – participant's name, sign, and meaning. Participants were instructed to first write their name in the first row, followed by the signs they created, and the meanings they assigned to them. These meanings were taken as anticipatory assumptions of the participants. After that, the drawings were shared with each other one by one, and the same procedure of filling the table continued, but this time they interpreted other participant's signs and assigned their own meanings to them. Participants were then given opportunity to share what they had written, while leaving their own drawings uninterpreted until the end. The aim was to circulate every drawing made by the participants among each participant and generate various interpretations. This process is sensitive to participants becoming consciously or

unconsciously influenced by other's interpretations, hence to avoid this bias, interpretations were initially written prior to verbal discussion and collective sharing.

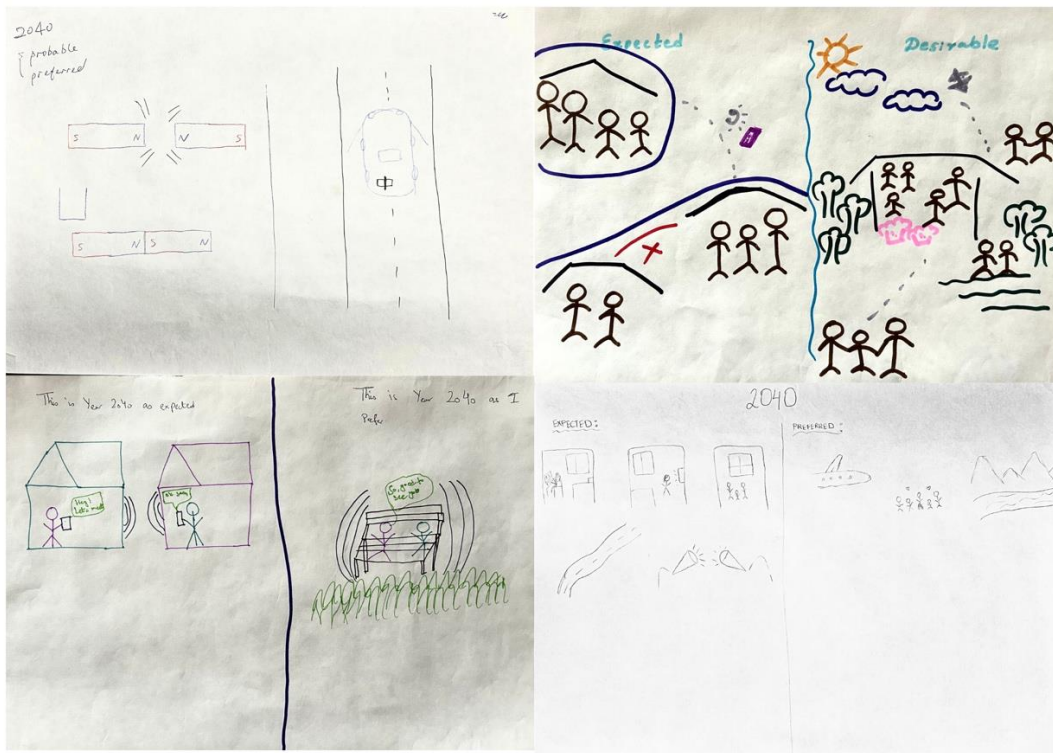


Figure 7. FLL 2 – Individual drawings of the participants from Phase I

The data for Table 3, 4, 5, and 6 has been extracted from the notes compiled by the participants on a sheet provided to them in a physical form. It was later matched with the audio recordings in which participants verbally explained what they had observed and written before. These tables comprise of two main sections i.e., illustrator meaning i.e., the meaning given to the signs at the time of their creation by the participant who drew, and peer interpretations i.e., the interpretations made by other participants of the same signs. All the statements written in the tables are written exactly as written by the participants, without making any changes (except for putting markers to identify convergence and divergence of AA and other aspects which point to interpretive plurality). It also enlists all the signs produced by the participants Y, T, S and B – pseudonyms using the first letters of participants' names to facilitate clarity and avoid confusion in the analysis – and for the sake of clarity of the reader, the visual signs are also cropped and added in the first column. The visual sign names, mentioned in the first column of the tables, are provided by the illustrators themselves. This distinction captures instances where peer interpretations assigned different names (mentioned in the following columns) to the same visuals, reflecting the ambiguity and interpretive plurality of visual signs. The drawings were meant to surface the expected and desired AA of the participants and to create a space for reinterpretations which either surface interpreters own imagined futures or the

illustrator's attributed meanings, or both. This will be analysed firstly through my own analyses of the written and verbal statements by the peer interpreters, and later through phase III –Reflect – where participants reflect on it themselves.

Table 3. Participant Y – Intended meaning and external interpretations of visual signs

Symbols indicate different interpretations made by other participants from illustrator's intended meaning.

*Visible also in their drawing for a preferred future. ^One sign seen as a different sign. **Not mentioned by the illustrator but seen by the interpreter. X Could not understand the sign. -- unmentioned by the interpreter



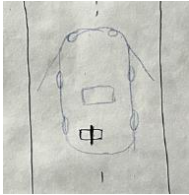
Visuals signs	Illustrator meaning	Peers reinterpretations
Probable futures		
Separate magnets 	One person with dual personalities depicted with blue and red of a magnet. Friends usually stay apart from each other	-People first get connected, then become friends, maybe X -Opposite personalities attract each other, while similar ones are at distance
Connected magnets 	Only connected when something new happens i.e., a wedding or a child, otherwise they stay apart	-It is battery. ^ Similar people clash in communication, a bit of a gap** builds understanding of each other
Preferrable futures		
Car 	A Friendship, and through this we can also travel together to future friendship	-Traveling with friends from different parts of the world* -Traveling long distances to see their friends -Having quality time with friends via travelling*
Road	The shared value ensuring friendship	-Unmentioned -- -Unmentioned -- -Unmentioned --
Car engine	Constant communications ensures a smooth flow friendship	-Unmentioned -- -A magnet^ maintaining the connection between those sitting in the car -Unmentioned --

Table 4. Participant T – Intended meaning and external interpretations of visual signs

Symbols indicate different interpretations made by other participants from illustrator's intended meaning.

**Not mentioned by the illustrator but seen by the interpreter. ^One sign seen as a different sign. ~Visible also in their own probable futures. *Visible also in their own preferred future. -- unmentioned by the interpreter







Visuals signs	Illustrator meaning	Peers reinterpretations
Probable futures		
People 	Different families in different countries (blue lines) are isolated in their homes (black lines). There is no contact with nature.	-Individuals or families -Isolation (black lines) – connected with families but not friends -People sticking to their own circle of friends~ Only thoughts, no action (dotted lines)**
Phone and social media 	These are the only sources of connection left, and no physical contact. The people living in separate countries get connected through phones, but closer ones are not friends anymore.	-People only talk through phones -Connection between friends is through phones, but no physical connection with friends -Unmentioned --
Red cross 	Although some friends live nearby, they do not talk anymore	-Some people don't have phones, so they are excluded from building friendships -Unmentioned -- -Social distancing from others, not friendly and communicative to others~
Preferrable futures		
Clouds, sun and trees 	Friends meetup in nature, enjoying time with friends and family. These natural elements because it is difficult to imagine a world without natural elements in the future, but I desire to have more of these like friends meet outdoors. They hang out in the nature.	-Indicate prosperity of offline friendships* and some people are surfing on the river^ -Friendship brings warmth (sun) and growth (tree). There is a connection and closeness (black lines on left and right)** -Outdoor meetups
Airplane and footsteps 	People come from different countries to visit their friends 'physically'	-Kite^ (airplane) is prosperity -Unmentioned -- -Meeting and socializing more with others and spending quality time
Cup cakes 	They bake together and have quality time. They love baking	-Offline and relaxing activities for building friendships* -Connection over sharing food, but here sharing could be over anything not just food, and through this you make a bond -Unmentioned --

Table 5. Participant S – Intended meaning and external interpretations of visual signs

Symbols indicate different interpretations made by other participants from illustrator's intended meaning.

^One sign seen as a different sign. **Not mentioned by the illustrator but seen by the interpreter. ~Visible also in their probable futures. *Visible also in their preferred future. -- unmentioned by the interpreter


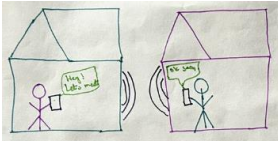



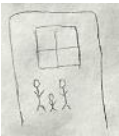



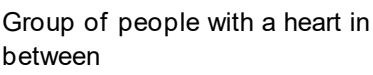
Visuals signs	Illustrator meaning	Peers reinterpretations
Probable futures		
Rectangle block in hands 	Mobile phone representing that connection is limited to social media and texting only	<ul style="list-style-type: none"> -The intermediate to build friendships. Words** as indicators for friendship. They asking to meet but they will never really meet ~ -Connection via phones only~ -Online-based friendship but still communicating through great technologies~
Two houses 	No physical meeting. one purple human inside a blue house, and one blue human inside a purple house mean that the souls want to connect but the physical body has isolated itself inside the house. The circular waves outside mean that their souls have same energy level or frequency.	<ul style="list-style-type: none"> -People only stay at home to build friendships~ -Friends want to meet physically but they only connect via phone -Friends would be a bit distant from each other~
Preferrable futures		
Bench 	Represent a real strong connection where souls connect and friends really 'talk' with each other	<ul style="list-style-type: none"> -Grass** below the bench represents people meeting outside in a relaxing environment -Meeting physically and having a good time, they are also close to the nature (grass)**, no long distance relationship* -Meeting in person and spending quality time together*
Circular lines around	Energy, frequency and vibe.	<ul style="list-style-type: none"> -Waves^ (lines) indicators for friendship or WiFi -Unmentioned -- -In their own bubble^ of friendship

Table 6. Participant B – Intended meaning and external interpretations of visual signs

Symbols indicate different interpretations made by other participants from illustrator's intended meaning. *Visible also in their own preferred future. ~visible also in their probable future. ^One sign seen as a different sign. X could not understand the sign.

Visuals signs	Illustrator meaning	Peers reinterpretations
Probable futures		
A person on computer 	Online friendship. Communication is online-based	-People stay at home to build friendships -Some friends are alone and working or entertaining at home -Laptop refers to connection being limited to online chats~
A person inside house 	Not making time for others and avoiding social gatherings	-People engaged in their own activities like watching TV -Friends are isolated in their own spaces~ -People are having alone time and they are okay with that~
A family inside house 	Family over friendship	-People have own things to do -Some people are with their families some are alone -Family having their own time
Empty road 	Friends distancing from each other whether its physically or emotionally	-No one is outside -No connections with the nature~ -People not getting together to celebrate (connected with the sign below)
Megaphone 	Communication issue, people will try to solve it somehow	-Friends don't meet outdoors. These are lights/bulbs^ -“Could not recognize this”X -Signs of celebration^ but no one to celebrate with each other
Preferrable futures		
Airplane 	Making time for friends and especially international friends. People would take initiative to travel and meet them.	-People travel together* -Friends from different countries are traveling to different parts of the world and meeting their friends* -Being able to travel to your friends around the world
Group of people with a heart in between 	Show loving emotions to friends	-They enjoy the activity very much -They are having a lovely time -Friends connected with each other and sharing love*



Mountains and river



Endless continuing relationship

-People travel together outdoors
 -Friends are enjoying while getting connected with the nature*
 -Being more connected to nature and also being connected to each other*

4.1.1 Probable futures as depicted in illustrator's visual signs

The qualitative semiotic analysis of these encoded meanings to signs, referring to the not-yet, revealed several prominent anticipatory assumptions of the individuals. I base my analysis on Peirce's concept of sign (Atkin, 2018) i.e., a representamen (a sign), an object (reference to), and an interpretant (given meaning). The kind of sign participant draws influence largely on the outcome of interpretations. Been stating that, participants relied on three categories of signs i.e., icons (resemblance), indexes (connection) and symbols (abstract), to represent their ideas of the future. Most participants relied on direct or literal representations i.e., icons, rather than symbolic abstraction to the imagined futures. In such situations, drawings become more like communicative prompts than symbolic artefacts. Despite this, the meanings given to the drawings can still enormously differ and will be discussed in detail in the later part of this section. However, the following section analyses some of the 'probable' futures imagined by the original illustrators and externalised through their drawings on friendship forming in 2040. The peer reinterpretations will be discussed later.

- The assumption that technology will be the constraining force in forming friendships emerged strongly in the context of this probable future. The representamen (or a sign) carrying these meanings were mainly 'phones', 'laptops', 'television', 'texts', and 'social media' etc. These signs referred to the fear of technology replacing human connections. The interpretant (or the meaning) given to these signs were mostly the fears attached with the onset of great technologies. Some statements by the illustrators which emphasized on this aspect were, "these are the only sources of connection left", "connection is limited to social media and texting only", and "communication is online based". Except for the fear, hope was also represented in some of the signs related to technology, i.e., one participant drew a "megaphone" hoping that "people will try to solve the issue of communication (through it) somehow."

- One assumption across the participants revealed the expected emotional or inner factor in humans which will hinder one from forming friendships. Signs like ‘circular lines’, ‘repelling magnets’, ‘empty road’, and ‘red cross’ pointed toward this assumption. The object and interpretant given to these representamen were that people’s “souls have same energy level or frequency” such that their “souls want to connect but the physical body has isolated itself”, “one person has dual personalities...friends usually stay apart from each other”, “friends will distance from each other whether its physically or emotionally”, and “although some friends live nearby, they do not talk anymore,” respectively.
- Dominant family ties over friendships were anticipated by most (3 from 4) participants. Visual signs like human icons, representing a family, under a roof were visible in two drawings. Participants expected that in the future, friendship could be affected because of the strong family ties. The given meanings include, “different families ... are isolated in their homes”, and “family over friendship”. Another underlying assumption revealed through the sign of connected magnets was that friends will only connect “when something new happens, like a wedding or a child, otherwise they will stay apart.” One participant signalled towards the place of meetups in the future being limited to only indoors and not outdoors, stating that “there will be no contact with the nature.”

The analysis represented that people assumed a decline in friendships due to several underlying assumptions, mainly technology, inner choices, and other preferences like family, or that the meetup places will be limited to only indoors, all showcasing fears related to friendship in the future. There is a little flash of hope reflected in one of the probable futures that they will try to solve the communication issue ‘somehow’.

Insights from the Reflection phase

This part solely includes statements on probable futures which were visualized and interpreted during the first phase. This part particularly refers to the reflection statements provided by the participants, enclosed in a written form. Nonetheless, the reflection phase also depicted that participants (illustrators) were made aware of their implicit assumptions when they heard interpretations made by others (interpreters) on their drawings. For instance, a participant stated that, “in my drawing, I was surprised to hear when the message/conversation between two friends on meeting each other was assumed to be a way for people to avoid each other instead of bringing them closer, I fear that this might be something we see in the future.” Another participant stated, “I do not want to be alone all the time” and, later, “I do not want to lose a friend” which revealed their

internal fear of being left alone in the future. Other's interpretations also led to the element of surprise to one's own drawing, for instance, participants revealed that, "some did not understand the drawing or interpreted it in a different way which I did not think of it as", and "I like the way they explained because this is not what I meant but this is also how I think about the future." Meanwhile, interpreting one's own drawing also surprised them, for instance, participant stated, "when I explained the reason for using specific colours ... the idea that we can stay connected spiritually when physical connection is not possible, was something I realized in that moment." Other participants stated that, "(explaining) it made me realize how I need to put effort into the friendships I have", and "after explaining it, I realized that the smooth car is also ensured by a driver." Participants also acknowledged that their assumptions are enclosed in these visual signs, for instance, "...since my assumptions about the future have been already reflected in my own drawings."

4.1.2 Preferred futures as depicted in illustrator's visual signs

The signs drawn by the illustrator to reveal their 'preferred' futures were also analysed in the similar way as above. These futures were drawn beside the probable futures. All participants agreed to follow the same procedure. Some of the preferable futures imagined reflected in the drawings were:

- The dominant assumption orbited around the importance of physical meetups and spending time together in real time. Signs like airplane, natural elements including 'sun', 'cloud', 'trees', and 'bench' were put to be analysed in this category as they all highlighted the significance of spending time together in-person. The given meanings to these signs were, as narrated by the participants, friendship is supported when people "make time for friends... (and) take initiatives to travel and meet," "people come from different countries to visit their friends 'physically'," "friends meet in nature ... (and) outdoors," and unlike in the probable future where souls connect but people are physically apart, here there is a "real strong connection where souls connect and friends really 'talk' with each other (referring to their presence together)." Adding on to the last assumption, the "energy, frequency and vibe" matches when people will be present beside each other.
- Other surfaced assumption was centred on shared values which was depicted through a 'road' symbolising "shared value in a friendship", 'cupcakes' symbolising people "bake together," and 'circular lines' symbolising "same energy, frequency and vibe." Friendship is also boosted through constant communication as participants assumed and encoded these

meanings in signs like a ‘car engine’ and a ‘bench’. Other underlying assumptions were represented through ‘heart’ and ‘mountains and river’ signs, symbolising “loving emotions” and “endless continuing relationship,” respectively.

Apart from the above-mentioned preferred futures that participants imagined, there was one interesting aspect which came to the surface. Such that, the participants in their preferred futures excluded the whole narrative of technology. None of the participants ascribed technology to be the saviour of or contributor to a friendship forming. This aspect transformed in the reframing phase and will be reflected upon in its respective section. However, some of the added elements in the concept of friendship forming was ‘more inclination towards the nature’.

A semiotic chain of meaning-making through peer (re)interpretations

This part analyses the stage when drawings were circulated among participants, who then reinterpreted each other’s drawings. The reinterpretation first occurred in a written form, as to avoid biasness or influence from other interpretations, and then iterated verbally to share the given meanings among other participants. This section analyses the reinterpretations of both, probable and preferred futures. To begin with the analysis, the participants used several icons, indexes and symbols to materialize their AA, as aforementioned. The use of different kinds of signs (icon, index, and symbol) creates diversity in the meanings attributed to them, and thereby signifies the relevance of exchanging drawings among individuals. A semiotic chain of meaning making emerges amid reinterpretation because of two main reasons, firstly, because it destabilizes the meaning already intended towards the sign, and secondly, by doing so, it further reveals the anticipatory assumptions of the illustrator or the interpreter, or both. The two aspects will be discussed below.

Considering the first aspect, as Peirce asserts, meaning is never truly closed, fixed or innate, which creates a chain of infinite semiosis (Atkin, 2018). It lies under a distinctive feature of Peirce’s account i.e., interpretant – the meaning given to a sign. The interpretant is central to a sign and the sign is interpreted according to the context, experience, or future usage, and therefore all interpretations vary. Based on this and the empirical data, I claim in this study that meaning is also mainly attributed to a sign according to our own anticipatory assumptions. Despite the intentional meaning, which is given by the illustrator, resided in the sign initially, this was carried out to materialise, express, or surface one’s anticipation and thereby to give shape to it, and not to associated a fixed meaning. Nonetheless, as meaning changes with the context, considering that the context remained the same throughout the setting, meanings adhered to the anticipation pointing in the same direction i.e., the futures of forming friendships. Yet diversity is inevitable when different

meanings are attached to a sign – which can be seen as an icon, an index or a symbol by the individuals. Meaning that, the context can remain the same, but the attributed sign category can destabilize the meaning. For instance, indexes drawn by participant T – ‘sun’ and ‘tree’ – showed a direct, causal or physical connection i.e., it meant being *outdoor*. But the other participant recognized it as a symbol, interpreting it as friendship which gives *warmth* and contributes to the *growth*. Moreover, a symbol of a ‘road’ drawn by Participant Y referring to *shared values* was interpreted as an icon for road representing friends *traveling together*, and so on. These varying interpretations highlight the fluidity of meaning based on ones understanding of a sign with reference to either their own anticipations or the context (discussed in detail below). Sturken and Catright also state that “the meanings of each image are multiple, created each time it is viewed” (Weber, 2007). With this in mind, others, including myself and the reader, could assign their own meaning to these signs, based on our AA, by just looking at them.

Considering the second aspect, as drawings become a shared point between all participants, including illustrators and interpreters, the meaning circulates along the drawing. It provides more room for representamen, object, and interpretant – fueling the semiotic chain. Without this exchange of drawing and their varying interpretations, the artefacts remain individual sign production and meaning stays with the illustrator. When shared, these signs become shared referal points where meaning making further reveals or projects participants’ assumptions. The analysis can be carried out from the two point of views, illustator’s point of view and interpreter’s point of view. The analysis will additionally be supported by participants responses collected through reflection phase, along with empirical data.

- From an illustrator’s point of view, there are three possible ways to surface their anticipatory assumptions (AA) during the reinterpretation stage. When their drawing is interpreted by one participant followed by another, they encounter different meanings of the same signs they drew – to which they either agree (yes this is what I meant), disagree (no this was not my intent (a) and no I still do not think like this, (b) but yes that is something I also think of), or act surprised (this is very new for me to hear). Each aspect creates space to reflect, reconsider, and, to some extent, expand illustrator’s AA.

The empirical data reveals the following. One of the verbal expressions from the illustrator in the reinterpretation phase was, and I quote referring to the audio recording, “I really liked how participant S interpreted my preferred future, because those are very in-depth meanings.” This response suggested a moment of recognition by the illustrator. At another

instance, illustrator also agreed to one of the reinterpretations of their drawn symbol i.e., circular lines (the intended given meaning of which was vibe, frequency and vibe) interpreted as Wi-Fi (signals).

The reflection phase addressed this directly. Participant S statement, “I was surprised to hear (this) ... I fear that this might be something we see in the future,” showed that through the reinterpretation, illustrator recognized another underlying fear. Participant Y claimed, “one explanation from others is that ... I like the way they explained because this is not what I meant but this is also how I think about the future” which shows that interpretations have the potential to bring one’s AA to awareness.

- As stated above that the reinterpretations cannot be fully aligned with the actual given meaning, here the diversity of interpreter’s AA and the words used to describe the image become central. From an interpreter’s point of view, it has the following effects. Regardless of what they drew earlier, when they look at a different drawing, either (a) they project and reveal their own AA while reinterpreting (becomes a manifestation of their meaning-making (Seyahi, 2024)), or (b) they try to think from a perspective of the illustrator. The former aspect can externalise interpreter’s own AA, while the latter exposes them to a different AA – which enables them to acknowledge that alternative ways of thinking about the future exist. However, there is no rigid boundary between the two, both can happen simultaneously or in turns.

The first aspect i.e., interpreter might project or reveal their own AA, can be supported by empirically collected data. In the Table 1, 2, 3 and 4, certain symbols are assigned where peer interpreters projected their own probable and preferred futures into the drawings created by others (look for symbols ~ and * signalling probable and preferred futures, respectively). Overlapping examples of probable futures include more isolation, and online based friends, while preferred futures include travelling together and spending quality time. These assigned meanings are observed in their drawings and its interpretation, demonstrating that most of the times, while reading the signs drawn by others, they were revealing their own embedded assumptions.

The second aspect i.e., they try to think from an illustrator’s perspective, is applied when interpreter deliberately chooses to interpret it otherwise. Participants’ reflections demonstrate varying degree of perspective-taking. Their response includes, “I was interpreting according to my own assumptions about the future,” “I interpreted from the

drawer's perspective," "I have interpreted it in my own way. But I tried my best to go beyond that," and "it was more on the side of trying to understand the drawing first and then adding my opinion to it." Nevertheless, regardless of whether interpreters positioned themselves in relation to the illustrator's intent, the meanings continued to differ, prompting a sense of surprise. Meanwhile, empirical data shows that no drawing was interpreted in an identical manner across participants, which implies that perspective-taking does not resolve interpretive plurality but instead coexists with it.

Findings also unfolded interesting remarks made by the peer participants displaying uncertainty, ambiguity and surprising factors rooted in visuals. Some of the verbal expressions were, and I quote from the audio recordings, "I am confused," "It was really interesting, I was not thinking like that," laughter when participants mentioned something unexpected, like "these people cannot communicate because they do not have phones," questioning "why is it blue?", and "I couldn't understand it first, but now (after listening to another interpreter's interpretation) it makes sense." These differences made participants aware that my way of thinking about the future is not the only one, alternative possibilities could exist.

4.2 Anticipatory assumptions about the reframed futures of friendship forming 2040

This section aims to answer RQ2: *How does the process of collective sign making and their simultaneous interpretation influence participants' anticipatory assumptions?* The unit of analysis is not the assumptions articulated by participants, but the process through which meaning was constructed, negotiated and expanded in a collective phase. Contrary to first phase where the assigned meanings and underlying assumptions were not revealed till the end, this phase brings a twist by enabling participants to draw and reveal the meaning concurrently. By unfolding semiotics process as different meanings circulate among participants, this section directs attention to how meaning making shapes their anticipatory processes while they engage with a challenging reframed future. Furthermore, this section does not seek to analyse the conversation, interaction patterns, or dialogue structures, rather puts them as evidence of anticipatory emergence. The empirical data is derived from the audio recordings of lab interactions, and participants' reflection.

Phase II – Reframe – involved a group exercise of drawing making and started with the reframed scenario (introduced earlier in subchapter 3.3.2). The activity started with a brief period of confusion and disruption among participants towards perceiving this scenario as consistent with

their anticipatory frames. Some played with pens while others stared at the chart, gradually, participants began integrating the future scenario into their present lives. After a while they collected a range of anticipatory assumptions and started visualising them. Participants had freedom to draw anything initially, even random doodling as a warmup, allowing ideas to emerge naturally during the act of drawing.

As reframe model removed the language as a means of communication entirely (theme: silent resonance), it destabilized several embedded assumptions about friendship forming. The dominant assumptions from the previous phase, such as, ‘real talks’ through offline meetups, authenticity to be expressed through ‘words’, and friendship to be built through constant ‘communication’, were all challenged in this phase. Although the unit of analysis is not the futures participants came up with, instead the semiotic process, the context of futures remains crucial for understanding the emergence of meaning-making.

The evolution of meaning across sign interpretation, reinterpretation and expansion

This section analyses the signs where sign interpretation, reinterpretation and expansion occurred, along with the moments of interpretive tension, cognitive shifts, and recognition of differences. I analyse how the process of semiosis unfolded throughout the collective phase of drawing, supported by the verbatim transcript extracted from the audio recordings.

The reframe model allowed participants to draw unusual connections and interesting associations of ideas around the topic. The data is categorised around few semiotic moments, namely sign emergence and interpretation, sign reinterpretation, sign expansion, and sign ambiguity – all observed during the exercise. The sign emergence and interpretation refer to the moment when a sign is introduced and given an initial meaning by the illustrator. Meanwhile, reinterpretation and expansion denote how other participants make sense of this sign, and instances where extended meanings or signs are attached with the original sign. Sign ambiguity indicates moments when the visual signs bring in the element of surprise or uncertainty. Instead of presenting the data following the same order, I organize data sequentially as participants proceeded in collaboration.

Participants began materialising their anticipations while distancing themselves from artistic skills. None of the participants came from the arts background, and certain conversations among participants pointed to the absence of their art skills as well. However, the absence of these skills signified two interesting aspects, (i) anticipatory assumptions and meaning can still be expressed through visual signs, and (ii) unintended visual resemblance sparks ambiguity and alternative

interpretations, enriching the whole discussion. As a variety of visual signs were introduced, the following examples capture only selected signs which articulated the anticipated meaning. The excerpts demonstrate how meaning-making and anticipation emerged through semiosis and how futures developed through the sign use.

1. Some participants started drawing earlier than the others. Gradually they attributed meanings to the signs they drew. Participant Y took the initiative, “this is a human being. My idea is that ... if we want to make friendships (we rely on the appearances)” (*sign emergence & interpretation*). Participant T continued to explain the sign they created, “in my view ... people randomly meet ... sometimes they help each other... then they become friends” (*sign emergence & interpretation*). Participant S develops on the previous two ideas, “it is the DNA. I am just going to draw the brain now” (*sign emergence*). “Oh, what does it mean?” (*sign ambiguity*). “It is kind of similar to what they (participant T) had (*sign expansion*). Sometimes people get connected ... (when) they meet, then they get connected through their brains because they have similar ideas, contrary to the idea of forming friendships based on appearance (as mentioned by participant Y)”. Participant S after a while developed this further, “here, so, because their hearts are not connected... but mentally they are connected.” Participant T draws a sign related to this idea, “can I add to yours? ... (so) sometimes the connection is just one sided” (*sign expansion*).
2. Participant T draws and describes, “... people have some kind of different food or happy pills to form friendship (*sign emergence & interpretation*). “(And) if our chemicals are not matching, ... I will buy this kind of chemical perfume to spray, and then I will be friends (with someone)” Participant Y adds (*sign expansion*). Participant T questions, “so is it like a friendship pill?”. “Yes.” At the end of discussion, participants referred to the idea, while discussing artificial intelligence and technologies, that “they can also develop a kind of way to somehow manipulate the chemical reactions, in a way that even when you are lying, the other person feels it is the truth” (*sign reinterpretation*). On this participant Y responded, “your notion responds with my two magnets before (in phase I), like a person has different personalities.”
3. The semiotic chain started again when new ideas were introduced. Participant B says, “what if there is a friendship alarm? Like in a certain radar where you can find friends with a ‘friend alarm’ that people would have. Alarm rings with each other, and after the alarm rings, people don’t stay with each other.” Participant S builds on this idea, “so, I am just

going to add to this...(draws), you have an alarm or an application.” “What is this? (*sign ambiguity*). “I am not good at drawing things; I will try to make a good Wi-Fi connection that you can understand” (*sign emergence*). Participant B responds, “what if you use the appearance on the application, like Tinder? (*sign extension*). “When they are passing by someone, their alarm rings ... your personality is tracked in your smartwatch (*sign interpretation*). The colours basically are that this person has this person like personality.” Participant T adds to the idea, “I assume now, although it connects fast, maybe then technology won’t work and they will become haters” (*sign reinterpretation*). “And I think maybe the result should be updated, if the result shows they are not matching anymore, so they will be taken apart automatically... they become deformed just like this” (*sign and idea extension*). Later, closer to end of the discussion, when participants discussed how people will become friends with and through AI, they referred back to the initial sign, “you can put one chip in your brain, something that is tracking you, but not on the arm, in your brain.”

In the middle of the session, the drawing was rotated among the participants as shown in Figure 8., which led to further sign ambiguity and reinterpretation.

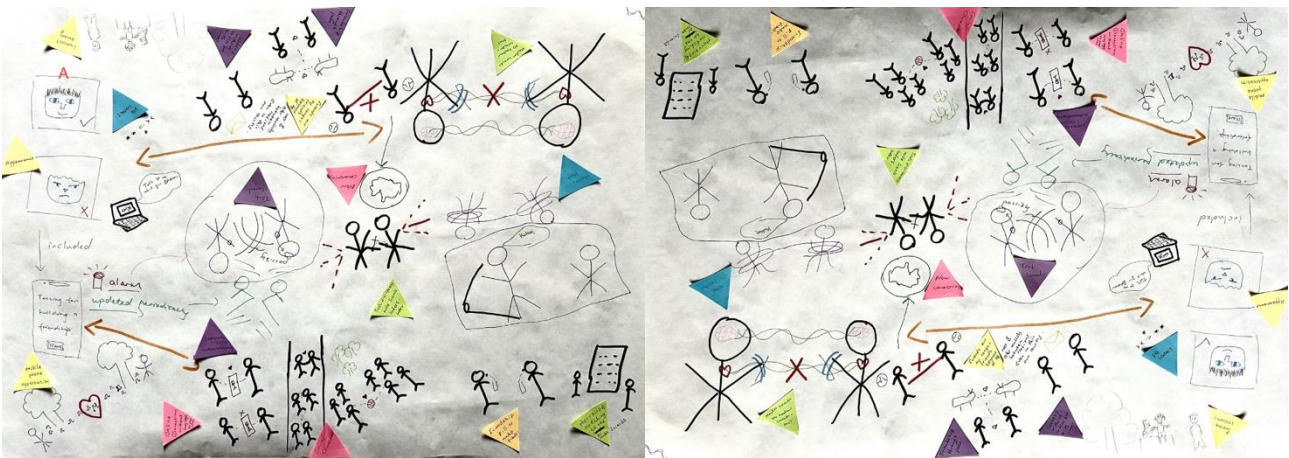


Figure 8. FLL 2 – Collective drawing from Phase II

The figure represents the drawings made by all four participants. The same drawing is shown twice; the second image is inverted to reflect the viewing orientation of the participants seated opposite during the exercise.

4. After the drawing was rotated, participant S asked, “can I ask why is there a cross here?” (*sign ambiguity*). “Sometime people will become friends, but sometimes they will not become friends” illustrator replied. Participants started looking out for different modes of communication like, “signing or humming ... it is like birds but then they are humans” (*sign emergence*). This shifted the idea towards forming friendship through pets, as the other participant added, “in this context, sometime animals like dogs get connected to each other,

the after that, dog owners will become friends” (*sign extension*). Here it also occurred that one person produced a novel idea, while the other person drew. Participant aimed at drawing a dog but instead drew a sheep, while the other participant added, “it is (a sheep) from the future ... gene modified, half dog, half sheep. It is a ‘friendsheep’ (laughter).”

5. After a while, participants also began noticing new signs. “So why is this earth there?” (*sign ambiguity*). “As (another participant) says that friends will no longer be friends, because of war (at national levels) ... then my conclusion is that people will form a new country if they have similar personalities” (*sign interpretation*).

The reframe phase activated semiosis through interpretation and reinterpretation of signs and reconfigured the assumptions of the participants. Extracted through the empirical data, following are the categories of the futures formed: **(i)** alternative modes of communication. For example, music or humming, dance, animals, empathy, and emotional or mental connection, **(ii)** technological mediation. For example, a chip in the brain, universal apps, smart watches, and friendship alarm etc. (here it is important to notice that technology which became a problem in the phase I (i.e., causes isolation), it becomes a solution.), and **(iii)** redefining friendship itself: can be one-sided, based on horoscope, borderless, spiritual alignment (from interaction-based to connection-based friendship). Participants who were considering that meeting and talking maintains friendship, were looking for alternative ways to form and sustain a bond. They acknowledged that sometimes even when people communicate, it doesn’t necessarily ensure trust and long-lasting friendship; they suggested alternative ways of connecting, like through a mental and physical connection, empathetic behaviour, and helping mindset towards others.

From semiotics perspective, each sign represented an idea about the topic, for instance, humans, heart, globe, watch, trees, animals etc. were all sign creation events. These signs are not self-evident; meaning is required to explain the sign. The participant who drew, also gave a meaning to the sign. There were also moments of interpretation by others, whether they responded to the sign, questioned, or even laughed on it, indicating ambiguity of signs, surprise, and difficulty interpreting images. It shows that even when the illustrator explains, others still process the meaning. Interpretation also involves agreeing, expanding, or recognizing the meaning of the sign.

The signs become a shared referral point when participants return to the previous signs and add to them. Through arrows, they also try to connect new signs with the previous ones trying to build a connection and a story line. This is where the collective semiosis occurs. This phase captured how

anticipatory assumptions pertaining to the reframed future of friendship emerge and become negotiable and transformable through sign co-creation and interpretation.

To synthesize the key empirical insights, Table 7 presents four analytical anchors emerging from the data. The table does not represent fixed or discrete categories, rather the anchors developed by the researcher to organize recurring patterns observed in participants' interaction with visual signs.

Table 7. The four analytical anchors

The table presents the analytical structuring of recurring patterns observed across participants' interaction with visual signs.

Concept	Empirical observation in lab	Analytical implication
Polysemy and interpretive openness	One drawing led to multiple interpretations. Some signs were interpreted differently and even recognized as different signs	Visual signs functioned as polysemic cues, allowing participants to project different AA. Meaning is not fixed but emergent and negotiable through interpretations.
Visualisation and reference to the not yet	Participants materialised their probable, preferable and reframed futures through visual signs they produced	Drawings facilitated the externalisation and reconfiguration of AA, by making assumptions visible and negotiable
Interpretation beyond authorial intention and meaning accumulation	Interpretations by the interpreter preceded intended meaning given by the illustrator, adding a new layer to the existing signs. Meaning is not stable	Meanings developed through layered semiosis – where interpretations expanded the meanings of an existing sign – thereby revealing and reshaping AA
Emergent and transformative collective semiosis	Collective drawing and visual storytelling encouraged participants to create new signs, revisit meanings, add elements, and build upon original ideas	The visual artefact became a shared site of meaning making, through which AA were collectively negotiated and reconfigured over the course of interaction. Oscillation between AfF and AfE is observed

4.3 Reflection phase: Participants accounts of reframed anticipatory assumptions

This section introduces participants' accounts for phase III – Reflect, centring specifically on how their anticipatory assumptions were reconfigured through the interpretive exercises around visuals. The excerpts mentioned here are extracted directly from the participants' written reflections and demonstrate instances where initial assumptions, taken-for-granted ideas, and expectations were reconsidered. This section does not offer an interpretation of these responses, rather presents participants' own articulations of change, highlighting how engagement with diverse perspectives influenced their anticipation. Some of the excerpts are as following:

- “Firstly, for me the idea of technology was something that will distance people in future. However, after seeing different perspectives on how gadgets can actually connect people changed this idea of mine. The idea that traveling to see your friends is important to keep your connection alive became more important and motivated me to take out time to visit my friends more often. Another idea that I took for granted was spending more time in nature with friends as a way to stay close. This brought back the way I used to be connected to my friends when I was younger as we used to spend more time in nature.” Same participant added, “it was interesting that people can form friendships via dancing and their pets.”
- “It has expanded my idea of seeing how many forms of friendship there can be in the future, especially in a non-verbal way. It has made me realize how much communication is important between people but also that it does not only have to be verbal.” Another participant stated, “I believe my views were shaped by the perspectives of other participants and their drawings.”
- “Previously, I have never imagined building friendships with the help of technologies, even though there are some practical examples (e.g., dating apps and big data). I think this is becoming more important.”

The reflection phase also displayed what participants took with themselves from this experience. Some statements which reveal how, when exposed to three different kinds of futures i.e., probable, preferable, and reframed, this setting influenced participants’ present action are:

“The things I have took for granted before definitely became more important when imagining the different futures... it made me realize how I need to put effort into the friendships I have,” “firstly, for me the idea of technology was something that will distance people in future. However, after seeing different perspectives on how gadgets can actually connect people changed this idea of mine... it was eye-opening to see how these gadgets when used in the right way can become a tool to make new connections in the future... the idea that.. was new to me. It was also interesting that people can form friendships via dancing or their pets,” “Subconsciously, I value a lot the key drives for building friendships with considering the result. After the discussion, I realized that these key drivers don’t always show the result as imagined, since they have mutual influences. So, it is good for us to make collective drawings in the phase 2 to find links of different minds,” and “I believe my views were shaped by the perspectives of other participants and their drawings.”

Therefore, individuals developed the capacity to act creatively in the present without being constrained by fixed and predefined visions and were facilitated by the collaborative setting.

4.4 Summarizing the findings

This subchapter summarizes the results of RQ1 and RQ2 and ponders their reliability. Concerning RQ1, visual signs which were created by the individuals functioned as an empirical entry point into studying the process of semiosis and participants' anticipatory thinking. Through these signs – which referred to the not-yet – participants' anticipatory assumptions (AA) were revealed as a first step of futures literacy, materialised, and traced across the two rounds i.e., sign making and subsequent sign interpretation. Although assumptions, or in this research termed as meanings, initially were imbedded in the signs, they were destabilized via interpretations. As evident through the findings, visuals, through their inherent ambiguity, functioned as semiotic sites where multiple and evolving interpretations could occur through interaction. The exchange of drawings among participants proved pivotal, as signs did not remain individual production but became shared referral points unfolding several diverse future assumptions, expectations and preferences around the similar signs. It represented that meaning making is shaped by different frames of reference. Nonetheless, diversity in interpretations does not guarantee a shift in assumptions, it enables participants to realise that alternative ways of thinking about the future exist. FL is this capability, to think about your own assumptions and the assumptions of others about the future (Miller, 2015). It further generates moments of clarification, disruption, confusion, and predominantly the revelation of one's assumptions, thereby opening the ground of progression into the subsequent reframe phase of the FLL. However, the process did not deeply excavate assumptions, directing attention to observing how assumptions become expressed through signs, interpreted through interaction, and negotiated collectively. Figure 9 displays a semiotic process of meaning making and how it revealed anticipatory assumptions of both illustrators and interpreters.

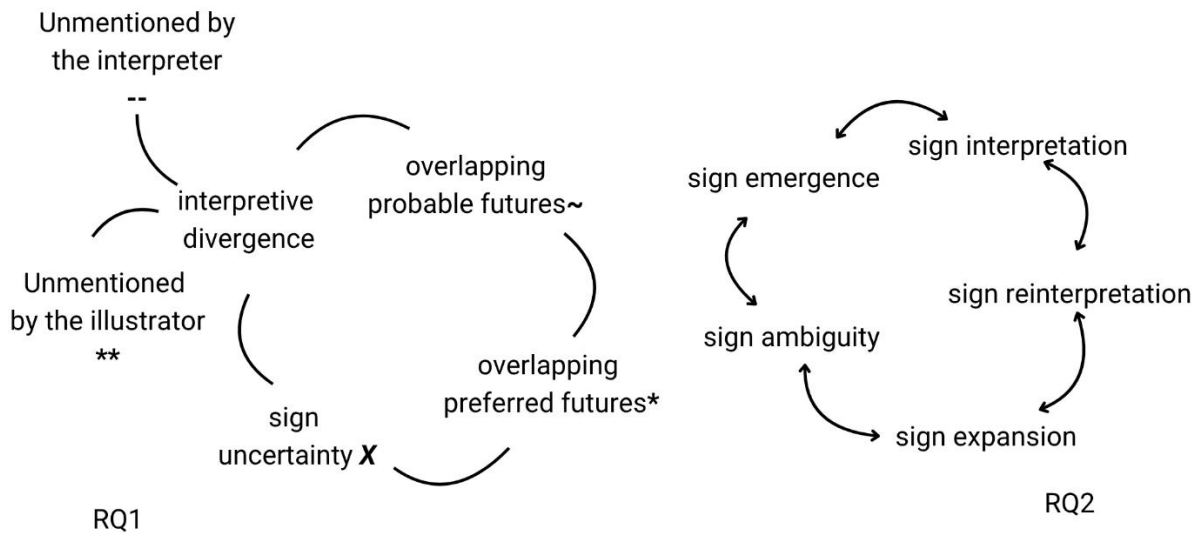


Figure 9. Illustration of the findings of RQ1 and RQ2 – semiotics-anticipation interplay

Regarding RQ2, the interpretive disruption became more visible when participants co-created signs as a team and engaged with a challenging future. Findings suggest that the process of semiosis became prominent at this stage and influenced and challenged the AA of the participants in a collaborative environment. Signs, which were static in the prior phase, became fluid along with the meaning leading to the emergence of new ideas, meanings, and future orientations. As new signs formed, various interpretations either gave rise to new signs, novel ideas, uncertainty, or ambiguity and at times, expanded and reconfigured assumptions of the participants. This overlapping and non-sequential process is depicted in Figure 9. It depicts the semiotic-anticipation nexus, and the mediating role of semiotics in anticipatory processes provides a brief overview and the summary of these processes which underwent side by side. Despite these findings, it remains undetermined whether there was a shift in participant's AA, however the discussion enriched after participants involved in interactive dialogue and built on each other's ideas.

5 Discussion

This thesis approached anticipatory processes through a process-oriented semiotic lens of meaning making. It observed how the activity surfaced, enacted, expanded or reconfigured assumptions in a collaborative setting. The study employed visuals as semiotic signs due to their inherent ambiguity, potential for diverse interpretations, and capacity to express creatively. Instead of studying *why* visuals produce several meanings and interpretations, it studied *how* visuals can be applied to study a phenomenon, such as anticipatory processes.

As I have attempted to bring forth in the pages of this research, semiosis can enable the conditions through which anticipatory processes can be analysed and meaning making assists these processes. In this chapter, I put forth my argument, contribution, and limitations pertaining to this research.

5.1 Potential of visuals in studying anticipatory processes

In this section, I discuss, based on the empirical data, the potential of using visuals as semiotic signs to study the anticipatory processes. As visuals were employed in the study not object of analysis in themselves but as means to analyse meaning making in relation to anticipation, they revealed tacit insights from the two futures literacy labs.

Comparing the two labs, the exploratory (first) lab largely produced ‘abstract’ signs, such as ‘lightening’ representing a digital strike, ‘ants’ representing futures researchers, ‘water’ representing nutrition, and so on. It displayed a huge diversity in meaning making. Meanwhile, the iterative lab involved more literal representations, such as, people, houses, and mountains all representing their literal meanings. Although, at a first glance, it appeared that the latter might limit interpretive diversity; however, the findings suggested otherwise. Even such visually explicit signs gave rise to multiple, divergent, and alternative interpretations. One example is when a participant interpreted the signs ‘sun’ and ‘trees’ not as originally intended by the illustrator i.e., being outdoor, but as something representing ‘warmth’ and ‘growth’, respectively, it indicated that the interpreters attempted to think beyond the literal meanings – bringing in the element of diversity. While it portrays a view that interpreters projected their own assumptions (mentioned in the analysis chapter) i.e., “half visual experience, half (expressions of) thought”, it also enforces Wittgenstein’s another proposition that visuals are not the carriers of rigid meanings, or vice versa, meaning is not inherent in visuals, instead, it emerges in use and interaction (Wittgenstein, 1989).

At the individual level, employing visuals encouraged participants to think and communicate beyond their habitual thinking and usual communicative comfort zones. Participants engaged with

visuals with varying degrees of ease, confidence, scepticism, and usefulness, as illustrated through the participants accounts:

“Initially, I had some doubts about whether my drawing would represent my ideas. But surprisingly, drawings helped me to communicate my thoughts up to a certain extent,” and “yes (it was easy to communicate ideas through drawing), but it did feel not enough to deliver all of my thoughts and perspective on certain details,” and “at first it was a bit difficult to express my thoughts through drawing but then as I continued sketching especially with the collective drawing, it became easier.”

These reflections point concurrently to both affordances and limitations of this mode, such that visuals brought forth constraints in fully articulating nuanced assumptions and initial difficulty in working with visuals. However, this tension is analytically productive, as it pushes participants to extend their thinking beyond familiar linguistic forms and habitual modes of expression, and to engage differently with their own assumptions. It disrupts the established ways of thinking and opens ways for alternative ways of imagining. Furthermore, the initial resistance to express thoughts through visuals diminished over time, specifically through the collective engagement.

While individual drawings served to encode participants’ probable and preferred future assumptions, it was through interaction and collective interpretation that these assumptions were revealed, negotiated, and extended. At the collective level, the potential of visuals became more pronounced. The iterative development of visual signs created a dynamic space in which ideas were shared, connections were built, and diverse interpretations emerged. Participants reported that:

“It (drawing) is not only a great way to express myself, but also to provide others with my own ideas. The important thing is that I can make connections among pictures for forming a wholistic view. For instance, I indicated that some applications in the phone can be used to test the compatibility to build friendships. Then other’s drawing also indicated the similar idea (mutual attractive watches). Then I make a connection between two pictures (applications result in the watch). Therefore, my ideas are expanded and easier to convey to others,” and “with the collective drawing, it (expression of thoughts) became easier. I think it was mainly because I could connect with other people’s drawings.”

These reflections show that engaging with others’ drawings helped them build on existing ideas, make connections, and ease the barrier. In this process, sign creation and interpretation did not simply align or diverge, but generated new meanings, broadening the range of anticipatory assumptions in circulation. Moreover, the perceived lack of artistic skills did not hinder

communication, instead, it often enriched the interpretive process, as participants sought clarification, showed uncertainty, and at time reinterpreted in their own ways.

Taken together, these findings suggest that visuals resist closure in meaning. They sustain a space of openness in which meanings remain changeable and extendable – the quality which is significant for the purpose of this study – as it enables the continuous articulation and reconfiguration of anticipatory assumptions. In this context, the potential of visuals lies not in their ability to represent ideas accurately, but in their capacity to keep meaning in motion.

5.2 Semiosis and ‘walking on two legs’ metaphor

Building on the premise that anticipation is the form that future takes in the present, semiotics offers a particularly useful way of approaching how anticipatory processes are both, revealed and, at times, unsettled. At the level of anticipation-for-the-future (Aff), qualitative analysis enabled the identification of predictive and goal oriented, or simply, stabilized meaning making patterns. Here, sign emergence and interpretation tended to operate within familiar zones. They pointed toward futures that were already implicitly formed through existing categories, narrative logics, and expectations. Through sign selection, arrangement, and particularly interpretation, it became possible to trace the underlying assumptions of the participants that anchor these projections. For instance, the prominent probable assumptions including controlling technologies, human’s emotional and inner factors, and dominant family ties, which might hinder one from forming friendships, all represented underlying structures that guide meaning making and constrain imaginative thinking. On the other hand, participants’ preferred assumptions remained situated within plausible parameters, such as physical meetups, shared values, and constant communication, which implied optimized and goal-oriented, yet confined, anticipatory frames. Through diverse interpretations of their assumptions, participants realised that alternative ways of thinking about the future exist, and through explicitly reflecting on their own assumptions, they brought their anticipatory frames into view.

Nonetheless, semiotics does not end at the level of exposing these structured assumptions. Because meaning is fluid and always contingent upon interpretation, the semiotic process itself holds the potential to loosen the coherence of these established frames. When participants gather in a collaborative setting and engage with a challenging future, the ambiguity surrounding the signs and multiplicity or dissonance in interpretation suspends immediate closure of meaning. Here, Panofsky’s levels of (visual) sign exploration – from immediate perception to, knowledge of culture and history, and understanding of beliefs and symbolic codes, Karaiskou’s emphasis on cognitive

perception and memory mechanisms, and Nadin's proposal that meaning making is always oriented towards possible future – all play a role in producing diverse interpretations, and thus establish a ground for AfE. Unlike individual drawing, where an initial meaning often precedes and later undergoes destabilization, the collective process upholds ongoing semiotic instability where drawing is continuously shaped through the layering of multiple meanings and future orientations. Meaning remains in flux throughout, enabling the continuous production of new signs and ideas. During this 'interpretive disruption', meaning becomes visible as constructed only in relation to other meanings. Disruption reveals contingency of meaning which expands imaginative capacity. Anticipation, therefore, evolves in accordance with how people make sense of signs and extend their meaning towards the future.

Empirical observations show that participants often reported elements of surprise, confusion, or discomfort – these are not mere side effects, they are evidence of disrupted anticipatory frames. Some of the comments which capture this aspect were:

“What does it mean?”, “you mean people can become friends if they do not judge each other?”, “then what happens?”, “what alarm?”, “what is that?”, “can I ask you why...?”, “how would we elect people without language?”, “why is this (sign) here?”, “I was stuck with some thoughts,” and “it is a bit worrying for me to think about a future without communication to build friendships.”

Furthermore, instances where participants built upon each other's signs and ideas, like, “it is kind of similar to what (participants X) drew”, “contrary to the idea (which another participant suggested)”, “can I add to yours?”, “...this reminds me of one story”, and “I am just going to add to this”, symbolise the intersection of ideas in a collaborative setting. Collective semiotic setting also destabilizes dominant anticipatory frames. When each individual brings a different anticipatory system, and encodes different meanings, causal logics, and what counts as “possible”, the previously “natural” interpretations become visible as constructed, and anticipation shifts from taken-for-granted to questioned to reconfigured. The converging interpretations reflected a collectively constructed orientation toward the future. This process can be related to Merrell's concept of “conscious becoming” – a Peircean-inspired concept that human's conscious is not a fixed “product” of mind, rather a dynamic process – a process which involves “signs incessantly becoming other signs in interdependent, interactive interrelatedness” (Merrell, 2013). It suggests that the shift is not merely in their content of thinking but their awareness of how they engage with alternative future possibilities.

Sign creation → interpretation → new meaning → extension → new awareness

It is within this space of interpretive openness that a movement toward AfE becomes possible. Not as a definitive transition, but as gradual reorientation in how meaning is approached. Individuals develop the capacity to act spontaneously and creatively in the present without being constrained by fixed and predefined visions. They begin to consider alternatives that are not directly anchored in previous instrumental goals or expectations, cultivating a mode of thinking that remain attentive to the likelihood that meaning, and therefore the imagined futures, could unfold otherwise. This symbolised Miller's 'walking on two legs' metaphor – AfF and AfE – about “becoming better able to engage in spontaneity and improvisation through acquiring the knowledge needed to sense and make sense of emergent complexity” (Miller, 2018).

Oscillation between AfF and AfE

Although AfE loosens the grip of AfF and pushes the boundaries of conventional thinking, there are instances when participants are encountered with their imaginative constraints, and thus they refer to their existing thinking frames while engaging with a challenging future. During phase II – Reframe – certain sign creation appears to be influenced by participants' cognitive, disciplinary, cultural, and other experiential contexts; however, probing these remains beyond the scope of this research. Several illustrations showcase the oscillation between AfF and AfE, and the challenges in approaching alternative futures. For example, one participant from natural sciences discipline, specifically from Molecular Systems Biology, drew an illustration of 'DNA' as well as 'gadgets which can incorporate human traits.' Moreover, one of the interpretations originated from the cultural impact, i.e., 'making friends through dance', which participant themselves stated emerged from their ancient cultural history. To some extent, 'friendship based on the appearance' also connoted personal preference of the illustrator. Furthermore, 'meetup in the nature' was another example of overlapping preferred and reframed futures. Despite this, the meanings attached with these signs varied vastly from the previous meaning making and pointed to creative and novel ideas.

5.3 A tentative reference to 'anticipatory semiotics'

The findings of this research point to close entanglement between semiosis and anticipation, as participants engaged with futures through processes of sign making and interpretation. In light of this, I tentatively refer to this intersection as 'anticipatory semiotics', where AA is revealed, shared, and reconfigured through the representational and interpretive activity. To trace the process of semiosis, visual signs provided an empirical entry point through which assumptions were externalised, encountered by others, and further expanded in interaction. Meanings are continuously formed, questioned, and developed as participants orient themselves towards a reframed future. In

this context, anticipation becomes accessible through semiosis, taking shape in very act of engaging with signs. Referring to Nadin’s proposition that “future is made part of the present via semiotic processes” (Nadin, 2014), and action is guided by representations which one creates in their mind, it can be extracted that anticipation is driven by semiotic processes of meaning making. The visual signs created by the participants in this study can be understood as materialized representations, acting as an impetus to re-enter a semiotic process. This framing allows process of anticipation to be understood as a continuous interpretive process rather than a fixed orientation.

Figure 10. illustrates the emergence of anticipatory semiosis at the nexus of visual signs, semiosis, and anticipation. Visuals, through their inherent ambiguity, enable the expression of anticipatory assumptions and invite diverse interpretations due to their polysemic nature. The visual signs are interpreted through semiosis. The interpretive process, oriented toward the future possibilities, revealed and at times reconfigured anticipation as diverse meanings surfaced.

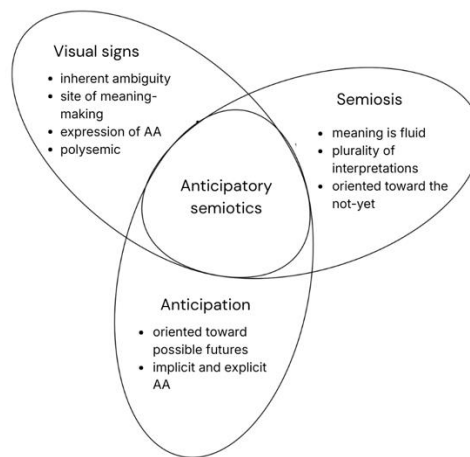


Figure 10. Intersection of visual signs, semiosis, and anticipation

Conceptual diagram showing how ‘anticipatory semiosis’ appears at the intersection of visual signs, semiosis, and anticipation.

5.4 Contributions and limitations

This paper contributes to the growing field of futures research by bringing forth an empirically grounded understanding of the interrelation between anticipation and semiotics. Specifically, it proposes alternative ways of addressing anticipatory processes, such as through semiotic engagement. By positioning visual signs creation and interpretation within Futures Literacy Lab setting, the research demonstrates how anticipatory assumptions – often implicit and abstract – can be rendered visible, shareable, and challengeable through interaction. Furthermore, by highlighting the productive role of ambiguity, interpretive multiplicity, and meaning instability, the study offers

a methodological contribution to the use of visual signs as a site for engaging with creative thinking and anticipatory dynamics. Addressing the relative under theorization of visuals in futures research, the study developed their conceptual grounding by positioning them within a semiotic framework, showcasing their potential to serve as sites of meaning making and emergence. The semiotic processes additionally can support forms of thinking aligned with anticipation-for-emergence, thereby positioning semiotics not merely as a medium of expression, but as a dynamic process of meaning making through which anticipation becomes visible and reconfigurable.

Like every other research, this study also has several limitations that should be acknowledged. First, the research emphasizes primarily on semiosis which emerges through visual signs, treating drawings as the hub of semiotic medium through which anticipatory assumptions are surfaced and negotiated. While language and verbal communication remained vital in explaining meanings, they were not analysed as a semiotic unit in its own right. This delimitation was essential to sustain analytical focus, but it inevitably narrows the scope of this research. Some (semiotic scholars) might argue that the sign interpretation was not fully open-ended as the context was given and signs were generated by the participants, to its defence, this study does not only centre on sign interpretation but also the act of sign creation when novel ideas emerge, meanwhile the use of a shared contextual frame provides a common ground and empirical setup for this research to take place.

Secondly, as the exploratory (first) lab was not systematically recorded, the primary empirical data is extracted from the second lab which involved a limited number of participants, therefore the findings are not intended to be statistically generalizable. Instead, these findings provide an in-depth, process-oriented understanding of visual meaning-making within a specific experimental setting.

Thirdly, the analysis is intentionally confined to the immediate context of the labs and does not extend to incorporate the role of broader cultural or social semiotics systems, which may also shape how signs is drawn, meaning is given, and sign is interpreted. Therefore, it did not involve the identification of the origins of anticipatory assumptions or why participants imagine a certain future. Moreover, the presence of researcher, including the facilitation guide, prompts, and structuring of the exercises, more or less, can have influence on participants' meaning making processes, even though efforts were made to minimalize such effects.

6 Conclusion

In my exploration, at the interface of semiosis and anticipation, I examined the impacts on anticipatory assumptions when one involves in a process of meaning making using visual semiotic signs. The qualitative and process-oriented analytical framework was applied across the empirical findings, to search for the answers of two key research questions: “How do hand-drawn visual signs render anticipatory assumptions visible within the methodological setting of Futures Literacy Labs, surfacing a wider range of assumptions?” and “How does the process of collective sign making and their simultaneous interpretation influence participants’ anticipatory assumptions?” Through the empirical data, it became evident that participants were able to express, to varying degrees, assumptions through visual sign creation. However, it was through the exchange of drawings that the underlying assumptions surfaced and meanings circulated, rendering the semiosis traceable. The data is encoded under ‘overlapping probable futures’, ‘overlapping preferred futures’, ‘sign ambiguity’ and ‘interpretive divergence’ categories, all pointing to, both, ambiguity inherent in visuals, and recognition of diverse assumptions. It was also interesting to observe that signs which were randomly drawn by the illustrator were noticed and assigned a meaning by the interpreter, making illustrator aware of their implicit thoughts, or otherwise assisting their awareness. The assumptions however remained situated within plausible parameters. Moving forward, the process of semiosis became more evident during sign co-creation and simultaneous interpretations, when signs constantly remained in flux suspending the immediate closure of meaning. Even after the completion of one sign, participants kept referring back to the previously created signs and generating new ideas, either as an extension or opposition. Data was encoded across the following categories, ‘sign emergence and interpretation’, ‘sign reinterpretation’, ‘sign ambiguity’, ‘sign expansion’, and tracing these moments facilitated observation of changing assumptions. Through embracing the multiple ways of approaching and knowing the future, participants’ imagination was liberated, allowing them to wander with greater creativity and uncertainty.

In conclusion, contrary to the notion that anticipation is often fixed and remains anchored in predictive models, visual integration in a futures-oriented setting suggest that anticipatory processes cannot only be studied, but also revealed, materialised, articulated, and unsettled through the process of sign creation and interpretation. It is within this space of interpretive openness that a movement from goal oriented and predictive future assumptions to embracing a challenging future and novel ways of thinking becomes possible. This movement is not visible as a definitive

transition, but as gradual reorientation in how meaning is approached, and actions are taken in the present.

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Appendices

Appendix 1. Facilitation guide (provided with omissions)

1. Introduction	15 min
<ul style="list-style-type: none"> - Introduction, consent form, and disclaimers: <p style="margin-left: 20px;">Hello everyone! First, I would like to thank you all for taking out time today and joining this lab. I will distribute a consent form among you, which includes details related to the use of information extracted from today’s lab. Please have a look at it, and at the end, write your names, as you feel like, and your respective fields.</p> <p style="margin-left: 20px;">The topic of today’s discussion is “future of forming friendships”. I will introduce it in a while, but before that, I would like to mention a few important things. Please be respectful to each other’s ideas and perspectives. Everyone may imagine the future differently, and that diversity is important for this lab. There are no right or wrong answers here. Please listen to everyone and allow everyone space to share. And remember participation is always voluntary – share only what you feel comfortable sharing.</p> - Introducing topic: <p style="margin-left: 20px;">As I mentioned earlier (writes on the white board), the topic of today’s discussion is “futures of forming friendship – 2040”. As you can already see, I wrote future’s’, so today we are going to explore, not predict, several futures, see how we think about the specific topic, and what we can take with us from here today.</p> - Agenda: [Explained through the first exercise] 	
2. Reveal: Probable and preferable futures	1 h 20 min
<ul style="list-style-type: none"> - Let’s begin our mental time travel to the future. I would like to ask you to close your eyes and take a few slow breaths at your own pace. With each inhale, notice the sounds around you, and with each exhale, allow the thoughts from earlier today, yesterday, or the weekend to fade away. (Pause). Years have passed; and you have landed in the year 2040. <p style="margin-left: 20px;">In this moment, try to imagine friendship. Some parts of it may feel familiar, while the other parts might reflect what you wish friendship could become. How do people build connections and recognize trust? How do people know they are friends and sense closeness or distance? What interaction help friendship form, grow, or change?</p> 	

There is no single correct future here. What you imagine can be expected or desired, or a mix of both. Now open your eyes. Welcome to the year 2040.

Making (~ 17 min)

- Now, begin drawing and visualising the future of friendship forming in 2040 using signs, symbols, diagrams, or small, icons. Draw as many elements as you can that help show what friendship looks like in this future. You can also build relations between the elements you draw, or you can draw them independently; anything which shows what you expect and what you prefer. I will distribute the sheets and pens among you all now.

Plain sheets and pens of different colours and kinds distributed among the participants

- You will have 15 minutes to draw your probable and preferable futures. You are requested to only draw and not to write. That part is for later.

Reflection (~ 1 hour)

Step 1: Writing (~ 20 min)

- I will provide you a table with columns drawing illustrator, symbol, and meaning. First, write your name on the top of the paper, and in the first row under the heading 'drawing illustrator'. You can use your name or a pseudo name. In the next column, 'symbol', mention all the symbols you drew previously, or you can choose to draw one by one, followed by the interpretation or the idea behind that symbol in the next column, 'meaning'.
- Now exchange your drawing with the person sitting next to you and have a look at their drawing. Try to make sense of it. You can choose to look at it from the perspective of the original illustrator, or you can make sense of it on your own. Keep in mind the topic and the reason of the drawing – to discover probable and preferable futures – and start unfolding the drawing in your mind. Take a minute to process. Then, in the second row, write the name of the illustrator whose drawing you are holding, followed by the symbols you see, and the meanings you give to it. Repeat the process until you have interpreted all the participants' drawings. You have total 15 mins to do that.
- Ethical consideration – writing down first is driven by the idea of minimizing the influence of others. You might write what you see, but you might speak what you hear. To minimize

the influence of other's interpretation, you must write first. Later, will have time to explain and hear others' thoughts.

Step 2: Reflecting (~30 min)

- Make sure you have a drawing other than yours in front of you. Start with it. Try to explain what you saw and wrote in the table before. Explain briefly how you interpreted the drawing made by another participant on the same topic. Try exploring the signs and the meanings behind them. What do they tell you about the illustrator's probable and preferable futures? What are the common themes or ideas you see in the drawing? What is expected and desired when you try to look at the future from their lens? Does anything contrast majorly? Repeat the process but leave your own drawing till the end. Proceed one by one.
- Now put your own drawing in front of you. Tell us about what you drew. What are these signs and symbols, and what do they represent? What is your idea of the topic in the year 2040?
- Write a word or two for your probable and preferable futures. Try to keep in mind, what makes it like the way you picture it.

3. Break	15 mins
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4. Reframe: Introducing the Reframed future	40 mins
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Reframed future: Silent resonance

Prompt to the reframed future (~ 10 min)

- Before the break, we drew our expected and desired futures related to the idea of friendship forming. Both futures are informed by our experiences, what we have seen and known, and our reactions to it. We are now traveling to the Reframed future, which is going to be very different. It is a kind of future that maybe we have not really thought about before. It asks us to be creative, open, and to invent new assumptions. It is meant to feel confusing, and you might even get stuck. But that is all ok – we'll try to work through it as a group.

Facilitator reads aloud the reframe model

- What does friendship even mean in this future where words, explanation, and declarations no longer exist? Is friendship still about closeness? About choosing someone? About

spending time together? Or does the idea of friendship itself change in the world? In this future, draw what friendship could be, and how it would be formed.

Facilitator gives a big blank chart and pens to draw.

Making (~ 30 min)

- Form one group. This exercise will be carried out collectively. Start from your side of the chart and start drawing as a warmup for 2 minutes. This time is for processing and feeling yourself to be in a future like this. Once you start drawing, tell the person next to you, the idea behind that object you drew. Does it stand for something else, or is it in its true depicting form? Try to build on each other's ideas. Communication is encouraged. Getting a new idea from one's drawing and proceeding forward with your own idea is encouraged. Connecting different ideas is encouraged. Try to think visually. You are allowed to pause and explain. But every idea needs to be on the chart. Look at what others are drawing, try to make sense of it. Use post its to remember the assumption behind the drawings and to reflect on it later. Be creative!

Facilitator/s intervened at some points when participants switched to their preferred futures

5. Break	15 min
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6. Reflect

- Brief reflection was gathered at the end of the discussion to conclude the lab. However, a detailed reflection was collected in a written form. The questionnaire is attached in Appendix 2.

Appendix 2. Reflection form (Lab II)

We are back in 2026. Now that you have explored different projections and images of the future, take a moment to reflect on your journey. This phase requires you to compare all three futures, i.e., probable, preferable, and reframed, you created and got familiar with.

1. Comparing different futures, did anything you previously took for granted become ‘more’ or ‘less’ important for the futures of forming friendship? What do you think influenced you to shape your perspective in such a way?
2. When other participants reinterpreted your drawings, were there moments where you thought:
 - (i) “This is not what I meant but this is also how I think about the future”
 - (ii) “This is not what I meant but this is *not* how I think about the future”

You may answer with yes or no. If possible, please provide at least one example to support each part of your response.

3. Did explaining your drawing or hearing others interpret it make you notice something new about your own idea of the future and surprise you in any way? If yes, how?
4. When you were interpreting other drawings, were you thinking from the illustrator’s perspective (what they would have imagined while drawing), or were you interpreting according to your own assumptions about the future?
5. After phase I (individual drawing) and phase II (collective drawing), did your idea of the future of forming friendship change or expand in any way?
6. Was it easy for you to communicate your thoughts or future assumptions through drawings?
7. Were there elements in your drawings which you drew randomly but caught the attention of the participant/s who interpreted it?
8. Did seeing and discussing others’ drawings or visual signs influence or expanded your ideas on the topic? If yes, how?

Appendix 3. Pictures from the labs





Appendix 4. Use of AI tools

Adhering to the University of Turku guidelines on the use of artificial intelligence, the study made purposeful and limited use of AI tools in support of specific tasks. The two tools which were used were, namely ChatGPT and Google Gemini. Firstly, Google Gemini was used to assist in accessing and identifying relevant and current literature related to the research topic. Secondly, ChatGPT was employed in a restricted manner to support the refinement of a reframe scenario applied amid lab II. While the initial scenario had been roughly drafted prior to the lab, ChatGPT was used to effectively update and align the scenario with the anticipatory assumptions revealed in the first phase of the lab. As the scenario needed to be formulated between phase I and phase II, to enable the timely continuation of the research process, AI tool was used.

However, AI tools were used strictly as supportive instruments, with all analytical decisions, conceptual framing, and interpretations remaining under the control of the researcher. The suggestions from the AI sources have also been checked and verified by the researcher.