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# **Representing or/and experiencing time in audition**

Haeran Jeong

While listening to a piece of music, we perceive each tone as followed by the next. In this succession of tones, we recognise a melody consisting of tones with varying pitches. A single tone may linger before the subsequent tone follows it after a brief pause, with each tone differing in duration, thereby creating rhythm. We also recognise certain temporal parts of music as repeating refrains, whereas other parts occur only once. Hence, the perceptual representation of music comprises several temporal properties and relations: the succession of tones, the duration of each tone, the interval between tones, the repetition of tones or phrases, and possibly more.

Among these temporal properties and relations, philosophers often prioritise the succession of tones when explaining auditory experience, overlooking the role of other temporal properties and relations. In this paper, I critically examine this widespread view regarding Ian Phillips' Non Standard Memory approach and Wanja Wiese's Hierarchical Trajectory Estimation Model, corresponding to two branches of the specious present theory, extensionalism and retentionalism. Particularly, I highlight the limitations of these succession-based approaches in adequately characterising the experience of time in audition.

## **1. Why does succession matter in the philosophy of temporal experience?**

In philosophical discussions, time is predominantly understood as a system of relations between distinct worldly states. This system may involve temporal indexicals such as past, present, and future, applied to each state as temporally distinguished from others, or it may consist of earlier/later-than-relations, depending on A-theoretic or B-theoretic terms the system in question adopts, following McTaggart's distinction (1908). The intriguing question is whether these temporal relations are directly perceived as such or reconstructed through introspection, that is, whether representing time in this way is a perceptual act or a linguistic exercise that employs temporal concepts.

This question is of particular interest to philosophers of temporal experience who seek to defend the phenomenal reality of time against arguments for its physical or metaphysical unreality (e.g., see

review by Gruber et al., 2020; most prominently McTaggart, 1908). The motivation for this defence lies in the relative certainty of perceptual phenomenality; for instance, the appearance of the colour blue or the taste of chocolate are widely shared experiential qualities, making them largely uncontroversial. By contrast, the phenomenal character of thought content is far more contentious; for example, what it is like for a subject to think about peace or happiness is highly variable, influenced by personal history, linguistic context, and many other factors. Consequently, philosophers often appeal to the robustness of perceptual phenomenality to argue for the phenomenal reality of time (Bardon, 2023; Paul, 2010; Power, 2011; Prosser, 2012; Torrenco, 2024).

A classic example involves the auditory perception of melody (e.g., Russell, 1915). When listening to a sequence of musical notes, we seem to perceive them as a succession, say, note A followed by note B, rather than as isolated auditory events. This suggests that, whenever we perceive a melody unfolding over time, we also perceive time in terms of ‘A followed by B’.

However, this perceptual representation exhibits a fundamental unintelligibility, often characterised by the principle of simultaneous awareness. We seem to perceive both A and B simultaneously while also representing them as occurring in a non-simultaneous succession (see review Dainton, 2023 citing; Miller, 1984, p. 109). More precisely, there is an apparent inconsistency between the simultaneity of the perceptual acts representing A and B, and the non-simultaneous succession that these acts represent, namely, ‘A followed by B’. Thus, it remains unclear how the represented content of the non-simultaneous succession arises from perceptually representing acts that themselves occur simultaneously. Let me call this the *representational challenge*.

More crucially, ‘A followed by B’ is assumed to possess a distinct perceptual phenomenality that is irreducible to successively perceiving A and then B. Regarding this distinctive phenomenality, philosophers often refer to William James, who maintains that “[a] succession of feelings, in and of itself, is not a feeling of succession” (1890, p. 628). This additional phenomenality or “a feeling of succession” must be explained, which can be termed the *phenomenological challenge*, while also resolving the inconsistency between the simultaneity of perceptual acts and the non-simultaneous succession as perceptual content.

To account for the irreducible perceptual phenomenality of succession, William James offers the concept of the *specious present*. This concept posits that the experienced present has a certain duration to integrate instantaneous contents originating from different times. In other words, a single perceptual act represents different worldly states over a brief interval. While contemporary specious present theorists broadly accept this assumption, they diverge in their interpretation of how the specious present gives rise to the irreducible perceptual phenomenality of succession, leading to two competing accounts: *extensionalism* and *retentionalism*, following Barry Dainton’s terminology (2000).

According to extensionalism, the perceptual phenomenality of succession arises from conscious awareness directly mirroring the temporal structure of represented worldly states within a single

specious present, which is often termed ‘extended experience’. In contrast, retentionalism attributes this phenomenality to representationally extended content, wherein different worldly states at different times are integrated, independent of conscious awareness. Put differently, in extensionalism, one representing act persists for as long as the interval between its contents, reflecting their temporal relation. In retentionalism, the duration of a representing act need not mirror the interval it represents, nor the temporal structure of its contents.

To summarise, the phenomenal reality of time is defended by appealing to the perceptual phenomenality of succession or a feeling of succession. This defence involves two key challenges: (1) the *representational challenge*, which requires resolving the apparent inconsistency between simultaneously representing acts and the non-simultaneous succession as represented content, and 2) the *phenomenological challenge*, which demands an account of the phenomenal character of succession that is perceptual and irreducible to its constituents. The concept of the specious present is widely adopted to address these challenges, but the two competing interpretations, extensionalism and retentionalism, differ in their approach to the phenomenological challenge.

In the following sections, I examine these two branches of the specious present theory, as exemplified in Non Standard Memory approach (NSM) and Hierarchical Trajectory Estimation Model (HiTEM), focusing on whether and how they address these two challenges.

## 2. Ian Phillips’ Non Standard Memory approach

A classical strategy for resolving the apparent inconsistency between simultaneous representing acts and the non-simultaneous succession of represented contents is to take one of the representing acts as a form of remembering. NSM revises this memory theory by addressing key criticisms and adopting the extensionalism version of the specious present theory to account for the irreducible perceptual phenomenality of succession. While NSM successfully addresses the representational challenge by advancing the classical memory approach, it ultimately, I argue, fails to meet the phenomenological challenge, as the explanatory target, i.e., the irreducible perceptual phenomenality of succession, remains underspecified.

The classical memory approach traces back to the common sense philosopher Thomas Reid, who suggests that we perceive motion “by the aid of memory” (1850, p. 237). In the context of music perception, we perceive a melody as a succession of notes by remembering previously heard notes (Russell, 1915). However, this memory-based approach faces several objections from contemporary philosophers, two of which, termed the *illusion objection* and the *complexity objection*, are relevant to Phillips’ revision of the classical theory (2008). More crucially, Phillips argues that even with his

revisions, the memory approach remains insufficient for the perceptual phenomenality of succession. To address this issue, he supplements it with the extensionalist version of the specious present theory.

According to the *illusion objection*, the memory approach undermines the perceptual reality of succession, insofar as it conceptualises this relation as being mediated by memory recall rather than directly perceived. The *complexity objection* further points out that the memory approach does not inherently account for the temporal relation of ‘followed by’ itself. For instance, it does not rule out the possibility that one remembers a note heard an hour ago while simultaneously hearing a current note from a different piece of music.

NSM addresses both objections by refining the concept of perceptual memory through the notion of retention. Particularly, Phillips draws on Stout’s distinction between *retention* and *reminiscence* (1930)<sup>1</sup>, proposing that memory content can influence perceptual content without being explicitly manifest as such (2008). *Retention* is an implicit form of memory in which content is not explicitly recalled, whereas *reminiscence* is characterised by episodic memory recall.

By construing previous perceptual content as *retention* instead of *reminiscence*, NSM avoids the need for an explicit act of memory recall. While hearing a melody, only one note is heard at a time, and no separate act of memory recall takes place. Yet the experience of hearing that note is constitutively dependent on the previously heard note. For instance, perceiving *sol* as part of the melody *do-mi-sol* constitutively depends on previously heard tones (*do-mi*), in contrast to hearing *sol* after two crotchet rests. Though neither previously heard tones nor the rests are consciously present, they make an experiential difference in hearing *sol*. This constitutive dependence of present content on prior content allows for the perceptual representation of succession, without necessitating a separate, non-perceptual act of memory recall.

While NSM successfully addresses the illusion and the complexity objections by refining the classical memory approach, Phillips believes that it still needs to be supplemented with the specious present theory. Particularly, he argues that NSM alone fails to explain why perceiving a succession of tones differs phenomenologically from perceiving each tone in isolation, even when one tone follows another. In other words, NSM resolves the representational challenge but not the phenomenological challenge. To bridge this gap, Phillips adopts the extensionalist version of the specious present theory, which holds that conscious awareness mirrors the temporal structure of external events. Specifically, he contends that the relevant structure to be reflected in consciousness is the *filled duration* of tones. That is, conscious awareness is occupied by each tone’s tonal quality for as long as it lingers.

However, Phillips does not explicate how the filled duration of a tone in consciousness prevents us from perceiving that tone as isolated from others. Note that the explanatory target is not merely

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<sup>1</sup> This work overtly concerns Husserl’s retention. However, whether Stout’s interpretation or Phillips’ characterisation of Husserlian retention is correct goes beyond the scope of this paper, as I am not doing a Husserl scholarship.

distinguishing a continuous succession of tones from a discontinuous succession, for instance, distinguishing notes played at legato versus staccato. Rather, it seems a matter of interpretation, as Phillips contrasts two different ways of hearing the same discontinuous succession of notes: in one case, notes are interpreted as forming a succession, whereas in another, they are perceived as isolated from one another (*ibid.*, p. 180). Nevertheless, he does not specify what this difference in interpretation phenomenologically entails and what additional phenomenal character is introduced when tones are perceived as connected. As long as the explanatory target remains underspecified, it is hard to follow what role the conscious awareness of the filled duration of each tone plays in the experience of tonal connectedness. It seems to me that Phillips conflates filled duration with succession.

Rather than providing a precise specification of the explanatory target or clarifying the explanatory role of the specious present, Phillips appeals to rational reflection on our conscious experience, suggesting that the irreducible phenomenality of succession can be introspectively discovered (*ibid.*, p. 197). He specifically invokes the incorrigibility of judgements about one's own experience. However, this move risks an unwanted consequence: that 'A followed by B' is not directly perceived but conceptually and retrospectively reconstructed during introspection. Moreover, such rational reflection presumes episodic memory recall of that experience, thereby reintroducing the very problem that NSM aimed to resolve in the classical memory approach.

One possible way to specify the retrospectively discovered phenomenality of succession is to frame it as the recognition of a melody or speech, a recognition that is irreducible to the perception of each tone or phoneme in isolation. Imagine you are playing a piece of music for the first time while reading its score. You may recognise the melody after having played through the entire piece. Similarly, in listening to speech, you would understand what the speaker means after hearing all relevant phonemes and words. In both cases, it is obvious that recognition relies on the temporal structure of succession and is irreducible to the perception of constituents like tones and phonemes. However, it is not obvious whether such recognition is comparable with a feeling of succession, as recognised melody or speech involves qualitative or semantic content beyond the temporal structure (Matthen, 2010).

To summarise, I have shown that NSM successfully addresses the representational challenge through its revised memory approach, but it ultimately fails to meet the phenomenological challenge. While the specious present is introduced to explain the irreducible perceptual phenomenality of succession, it leaves the phenomenality in question underspecified. This underspecification possibly stems from a conflation of succession with filled duration, which can be resolved by correctly identifying the irreducible phenomenality present in our perceptual experience.

Alternatively, there may be no such phenomenality; It could be a mere abstraction of temporal structure derived from retrospective recognition processes, such as those involved in melody or speech recognition. If this is the case, then there is no perceptual phenomenality for which the specious present

plays a unique explanatory role. Consequently, the notion of the specious present would prove redundant in NSM.

Perhaps another specious present theorist, Wanja Wiese, offers a more compelling account of this irreducible phenomenality and successfully explains it by invoking the concept of the specious present. In the following section, we shall examine whether this is indeed the case.

### **3. Wanja Wiese's Hierarchical Trajectory Evaluation Model**

HiTEM builds on Rick Grush's Trajectory Estimation Model (TEM), a version of retentionalism. Notably, Wiese challenges Grush's strict distinction between perceptual and conceptual representation, which is based on a short interval of the specious present. This concern also extends to the irreducible perceptual phenomenality of succession, as retentionalism attributes phenomenal character to representational content rather than conscious awareness. To address the phenomenological challenge, HiTEM analyses the representational content into fine-grained features across multi-time scales, assuming an intermediary stage between perceptual and non-perceptual experience. While this approach provides a fresh insight into the cognitive process underlying the experience of succession, I argue that its applicability remains limited to certain predictable experiences.

HiTEM is motivated by recognising explanatory gaps in Rick Grush's TEM. Similarly to NSM, TEM meets the representational challenge by resolving the inconsistency between representing acts and represented content through the influence of retention on current content. Additionally, it incorporates the prediction of future events into a trajectory, within which perceptual representation is continuously estimated and updated. In this model, the position of current content within the trajectory constitutively depends on both past and future content (Grush, 2005, 2006, 2007).

Furthermore, TEM considers the specious present as embodying a critical duration for the perceptual and behavioural 'now', roughly 200 milliseconds (Grush, 2005, 2006). More precisely, Grush posits that representing something present beyond this temporal range involves concepts; a concept referring to the larger temporal whole influences the interpretation of its constituents. For instance, listening to tones as parts of a melody spanning an interval larger than what is perceptually available differs from merely distinguishing the currently heard tone from one heard more than 200 milliseconds ago (Grush, 2006). This distinction seems to resonate with Phillips' claim that there is a phenomenological difference between hearing a tone as part of a whole versus hearing it in isolation. However, whereas Phillips attributes this difference to a special contribution of conscious awareness that is occupied by filled duration, Grush considers this difference in terms of a shift from the perceptual representation of individual tones to the conceptual representation of a melody.

Wiese disagrees with Grush on the fixed duration of the specious present, which serves to demarcate the perceptual and conceptual representations. He argues that this strict distinction overlooks two key temporal phenomena: endurance and continuity (Wiese, 2017). Endurance refers to the experience of a sensory event persisting over an interval, such as a lingering tone. Continuity pertains to the seamless succession of contents without gaps, as in a legato sequence of musical notes, contrasted with the discrete succession of staccato notes. When maintaining Grush's distinction, temporal parts of an event that extend beyond the perceptually available interval of 200 milliseconds, such as segments perceived 300 milliseconds ago or later, must be classified as conceptual representations, while the other temporal parts within 200 milliseconds are currently perceived. This division implies that the same ongoing event is represented by two distinct acts, perception and concept-involving cognition, even though the phenomenal endurance or continuity remains unchanged.

To address the irreducible phenomenality of endurance and continuity during an auditory experience, Wiese proposes an intermediating representation in which the boundary between individual representations, and consequently between perceptual and conceptual representations, is fuzzy. He argues that a dynamic event representation, such as a melody, consists of relatively long-lived and short-lived property instantiations, i.e., features that are updated less and more frequently. For example, the timbre of a musical instrument, like a flute, is a long-lived feature compared to the pitch the instrument produces (*ibid.*, p. 14). Similarly, a melody is a long-lived feature, while each tone of the melody is short-lived. A long-lived feature spans over a certain interval, overlapping with both the previous and current short-lived features. In this way, a long-lived feature intermediates short-lived features at different times, providing a base for temporally integrating them.

A long-lived feature not only overlaps with previous and current short-lived features but also facilitates the prediction of upcoming short-lived features. This claim builds on two widely discussed assumptions in perception and cognitive sciences, which lead to the extension of TEM into HiTEM: the hierarchical architecture of cognition and predictive processing. The hierarchical architecture of cognition posits that perception involves lower-level processing, such as the simple registration of incoming sensory inputs, while conceptual cognition requires higher-level processing or the abstraction of registered features. According to predictive processing, predictions about lower-level features are generated by higher-level processing, which in turn influences the selection of sensory inputs to be processed at the lower level (*ibid.*, pp. 9 citing: Clark, 2013; Shi & Sun, 2019).

Applying hierarchical predictive processing to auditory experience, long-lived features are treated as relatively more conceptual and require higher-level processing, whereas short-lived features are relatively more perceptual and rely on lower-level processing. Consequently, long-lived features, such as the timbre of a flute, serve as predictors of lower-level features like pitches. Put differently, a long-lived feature forms the basis for generating predictions about upcoming short-lived features, and

previously processed short-lived features are updated into current features based on these long-lived, less frequently updated features.

Returning to our phenomenological challenge, HiTEM seems to address the irreducible phenomenality by attributing it to long-lived features predictive of short-lived features. That is, a long-lived feature functionally corresponds to a specious present with no fixed duration delineating perceptual and conceptual representation. Wiese posits that representing an auditory sequence not just “as succession of events but as hierarchical whole” (ibid., p. 19) accounts for the phenomenality of endurance, while the fuzzy boundary between perceptual and conceptual representation explains continuity. The theoretical benefit of this strategy lies in its exclusive reliance on clearly identifiable features, thereby avoiding interpretative ambiguity about the phenomenal character in question.

However, HiTEM fails to account for its two clearly identified explanatory targets, endurance and continuity. Recall that HiTEM aims to explain (1) the endurance of a lingering tone and (2) continuity as the seamless succession of tones. Consider the endurance of a single tone that lingers for more than 200 ms. In this case, its pitch persists just as long as its timbre. Thus, there is no need for predicting or mediating the endurance of the short-lived pitch based on the long-lived timbre, rendering HiTEM explanatorily redundant.

Now, add another lingering tone with the same timbre but a different pitch immediately following the first, forming a seamless succession, i.e., continuity. Compare this to a case where the second tone follows the first after a brief interval, creating a discrete succession. In both cases, one may argue that the shared timbre or melody intermediates between two tones. This indicates that the intermediating role of long-lived features is neutral to whether there are temporal gaps between short-lived features, failing to account for continuity. Once again, HiTEM offers no explanatory benefit.

The upshot is that neither endurance nor continuity is sufficiently accounted for by HiTEM, suggesting that it ultimately fails to address the phenomenological challenge. Similarly to Phillips, Wiese appears to conflate succession with a duration filled with tonal qualities. Discarding this confusion, HiTEM may still offer a viable theory for explaining melody or speech perception since it does not insist on genuine perceptual phenomenality and allows for a fuzzy boundary between perceptual and conceptual representations.

Nevertheless, attempts to apply HiTEM concretely to auditory experience reveal further limitations. While it is true that the timbre of a musical instrument, e.g., flute, constrains the set of pitches it can produce, it does not help predict which pitch will follow the current one. For instance, hearing the timbre of a flute rules out the expectation of low bassoon-like pitches, but it does not specify the next pitch in a melody. Wiese would reply that it is a melody, rather than a timbre, that enables the prediction of subsequent pitches. But how can one predict the next pitch of a melody when hearing it for the first time, if the melody is even unconventional, in experimental music?

Of course, the standard account of predictive processing (e.g., Clark, 2016, pp. 29–33; Rao & Ballard, 1999) offers more theoretical resources than Wiese considers. Most crucially, each low-level short-lived feature, such as a pitch that violates predictions concerning the high-level long-lived feature of a melody, will be registered as a prediction error. In turn, this prediction error would prompt an update of the high-level predictive model, depending on its epistemic salience, thereby facilitating the learning of a new melody pattern. Put differently, short-lived features that elicit prediction errors contribute to the formation of new predictions concerning long-lived features. One could even argue that short-lived features are predictive of upcoming long-lived features.

Wiese gives little consideration to the upstream propagation of prediction errors and seems to overemphasise the predictive contribution of long-lived features associated with the specious present. However, downplaying the explanatory role of prediction error in favour of the specious present ultimately undermines HiTEM's capacity to account for unfamiliar auditory experiences.

To summarise, HiTEM addresses the representational challenge to some extent by incorporating hierarchical predictive processing, but it fails to adequately address the phenomenological challenge. Its primary shortcoming lies in phenomenologically conflating filled duration with succession, which results in misidentifying endurance and continuity as proper explanatory targets; both can be accounted for without HiTEM. Nonetheless, HiTEM may still provide a viable framework for explaining certain predictable types of auditory experience, such as familiar melody perception or speech recognition, since it does not enforce a strict boundary between perception and concept-involving cognition.

### **3. Concluding remark: temporality of auditory experience beyond succession**

The temporality of auditory experience is widely characterised by the succession of tones in the philosophy of temporal experience. I have critically examined whether this characterisation is representationally and phenomenologically sound in two competing theories, NSM and HiTEM.

Both NSM and HiTEM sufficiently meet the representational challenge but not the phenomenological challenge. These theories resolve the inconsistency between representing acts and represented content by appealing to retention as implicit memory or/and predictive mechanism. This result indicates that we can represent auditory experience as the succession of tones, as we already do. However, both theories fail to address the irreducible perceptual phenomenality of this succession. The phenomenality in question is underdefined in NSM, while HiTEM departs from identifying endurance and continuity as irreducible phenomenality in question. Despite this different starting point, both theories fail to sufficiently address the phenomenal challenge for the same reason; they possibly conflate two distinct temporal features, filled duration and succession.

This failure could be interpreted as a thought bias shaped by the long-standing philosophical tendency to conceive of time as a system of relations between distinct worldly states. The succession of different phenomenal states fits neatly within this framework. By contrast, filled duration, a temporal property intrinsic to each phenomenal state, is difficult to grasp unless it is reconstructed as a succession of shorter filled durations. Nevertheless, no matter how brief a sub-interval might be, the filled duration of each tone requires a separate account from a succession of tones, since the structure as well as the underlying cognitive process of the former significantly differ from the latter.

Discarding the confusion of filled duration and succession, it seems that there is no irreducible perceptual phenomenality of succession that would necessitate the concept of the specious present. Consequently, there may be no phenomenological challenge to be addressed by adopting this concept. Alternatively, a feeling of succession is a derivative concept, retrospectively inferred from familiar melodic or speech structures that facilitate the prediction of subsequent tones or phonemes.

Nevertheless, it is premature to conclude that time is not directly perceived in auditory experience, given that other temporal properties and relations beyond the succession of tones may be involved. One such property is again filled duration, the persistence of a single tone over time. This temporal property may be directly perceived as a lingering pitch. The physical basis for pitch is the frequency of air vibration in our ears (Brugge & Howard, 2002), which itself is inherently temporal. Generalising frequency, pitch, and rhythm under the concept of periodicity, some auditory perception theorists argue that periodicity is ontologically fundamental to auditory objects (Matthen, 2010; O'Callaghan, 2007).

Another temporal property that merits further consideration is repetition, which carries both ontological and phenomenological significance. For instance, the repetition of a melody or speech allows us to form its representation, make predictions, recognise it as such, and anticipate its constituents, though repetition itself is not necessarily represented as such, much like implicit memory content as seen in NSM. Phenomenologically, repetition may imbue these representations with a feeling of familiarity.

Taken together, I suggest that duration, frequency or periodicity, and repetition, beyond succession, deserve greater attention in future philosophical investigations that move beyond the specious present theory and McTaggartian conceptualisation of time. These temporal properties are manifest in perceptual experience and play constraining roles in the formation of perceptual representations, as shown in the example of learning a new melody and recognising or predicting it as such. Accordingly, a closer examination of these properties will enrich the philosophical understanding of both time and perception.

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