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The Flow of Time in Experience

THOMAS SATTIG

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BIOGRAPHY

Thomas Sattig is Professor of Theoretical Philosophy at the University of Tübingen. He completed his D.Phil. at Oxford University, where he was also a British Academy Postdoctoral Fellow and a Junior Research Fellow. Subsequently, he held positions as Assistant Professor at Tulane University and at Washington University in St. Louis. Sattig works primarily in metaphysics. He focuses on issues concerning material objects, persons, time, modality, mereology, and indeterminacy, often following metaphysics to regions where it meets philosophy of language and philosophy of mind. His publications include the monographs *The Language and Reality of Time* (OUP, 2006) and *The Double Lives of Objects: An Essay in the Metaphysics of the Ordinary World* (OUP, 2015). He currently works on the nature and our experience of the flow of time.

EDITORIAL NOTE

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The Flow of Time in Experience

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March 2019

Our perceptual experiences as of change over time seem to be accompanied by the sense that time flows. The sense of flow is widely regarded as one of the most elusive aspects of temporal experience. In this essay, I shall develop a novel account of its nature. In Section 1, I shall give an initial characterization of the sense of flow as the sense that the present changes—in short, as the sense of replacement. Further, I shall specify the type of account of the sense of replacement to be developed: since the sense that the present changes will be assumed to be grounded in the perceptual representation that the present changes, my focus will be to explain the perceptual representation that the present changes. In Section 2, I shall develop an account of the synchronic perceptual representation of the present. In Section 3, I shall develop an account of the diachronic perceptual representation of the present as changing.

1 The sense of replacement in perceptual experience

We have perceptual experiences as of qualitative change. Consider a case of visual experience as of motion. When I look at a falling leaf, I see that the leaf *moves*. I do not merely see that the leaf hangs from a branch at a moment, nor do I merely see that the leaf is suspended in mid-air at a moment. I rather see that the leaf hangs from a branch before it is suspended in mid-air. Moreover, I do not merely *infer* that the leaf has moved, from memories of previously experienced momentary leaf-states. I just *see* that motion occurs.

Our perceptual experiences as of qualitative change over time seem to be accompanied by the sense that time flows, or passes, that time is dynamic, or fleeting, as this apparent phenomenal aspect is often described. To invoke a popular metaphor,¹ when I see that the leaf drops from a tree, I see that the leaf's state of hanging up in the tree moves from the present into the past, followed by the leaf's state of being suspended in mid-air, like a stick floats down a stream underneath a bridge, followed by another stick. The apparent sense of flow, or

¹ See Smart (1949: 483).

passage, is widely regarded as one of the most elusive aspects of temporal experience. In this essay, I shall develop a novel account of its nature.

I shall proceed in four steps. The first step is to offer an initial characterization of the sense flow, or passage—a specification of the explanandum—as the *sense of replacement*. The point of this characterization is to offer a phenomenological analysis of the sense of flow without appealing to spatial motion-metaphors. When I see that the leaf (literally) moves through space, I also seem to see that the leaf’s motion undergoes *replacement*. When I see that the leaf drops from a tree, I see that the leaf’s state of hanging up in the tree is replaced by the leaf’s state of being suspended in mid-air. I see that any momentary locational leaf-state is immediately replaced by another one. This apparent phenomenal aspect of my visual experience as of the leaf’s motion is the sense of replacement.

Visually experienced replacement is a kind of change. It is not, however, a local change tied to a specific object or scene. Replacement frames all visually experienced local change. It is a global phenomenon, the stage or canvas of all experienced local change. We can zoom in on the apparent sense of replacement by distinguishing between an object-state’s *obtaining* and its being *in the present*. When looking at the falling leaf, I experience that a qualitative change occurs in the leaf: I experience that the leaf’s hanging up in the tree obtains before the leaf’s being suspended in mid-air. In addition, I experience that a change occurs with respect to whether the leaf-states in the episode of motion are in the present. I see that the leaf’s hanging up in the tree is the unique leaf-state that is in the present before the leaf’s being suspended in mid-air is the unique leaf-state that is in the present. So I see that one momentary leaf-state disappears from the present as a new momentary leaf-state appears, which state in turn is seen to leave the present as its successor-state enters.

The sense of replacement, as I seem to find it in my visual experience as of a leaf’s motion, seems to accompany all of our visual experiences as of qualitative change. Moreover, the sense of replacement seems to accompany all of our perceptual experiences as of qualitative change. An auditory experience as of a rise in tonal frequency and a tactile experience as of a rise in temperature both seem to come with a sense of change with respect to which momentary state in an episode of qualitative change, concerning tonal frequency or temperature, is in the present.

Our perceptual experiences as of qualitative change have a temporal span of about a second. I shall call it a *subjective temporal horizon*.² Thus, if the leaf’s episode of motion from the tree to the ground takes thirty seconds, then this episode is too long to be immediately visually experienced as a whole. I can, however, have a range of individual visual experiences as of motion that jointly constitute a stream of consciousness that tracks the leaf’s whole episode of

² A subjective temporal horizon is often called a *specious present*. This notion is not to be confused with the notion of the present, in terms of which replacement is characterized.

motion. My focus here is on perceptual experiences as of episodes of qualitative change in the scope of a subjective temporal horizon.

The second step in the development of my account of the nature of our apparent sense of flow—now understood as the sense of replacement—is to specify the type of account of the sense of replacement to be developed. I shall specify the intended type on the basis of three *prima facie* plausible theses about our apparent sense of replacement.

First, it is plausible that our perceptual experiences as of qualitative change seem to us to be accompanied by a phenomenal sense of replacement because they really are accompanied by a phenomenal sense of replacement. This implies an existence claim, to be stated as thesis (T1).

(T1) Our perceptual experiences as of qualitative change are accompanied by a phenomenal sense of replacement.

Second, it is plausible and widely believed that all phenomenal properties of perceptual experiences are grounded in (or are identical with) representational properties of these experiences. This is *representationalism* about perceptual experience. I take this to be the default position concerning the relationship between the phenomenal character of perceptual experiences and intentionality.³ Thesis (T2) follows from perceptual representationalism and (T1):

(T2) The sense of replacement in our perceptual experiences as of qualitative change is grounded in representational properties of these experiences.

Third, according to a *prima facie* natural account of which representational properties the sense of replacement is grounded in, perceptual experiences as of qualitative change come with a sense of replacement because the contents of these experiences represent replacement. Thus, I seem to see that the momentary leaf-states making up an episode of locational change undergo replacement because I have a visual experience whose content represents the motion of the leaf as involving replacement. The *single-domain view* of the representational properties invoked in (T2) will be stated as (T3). (I shall mention a dual-domain view at the end of this section.)

(T3) The sense of replacement in our perceptual experiences as of qualitative change is grounded in the representation of replacement in the contents of these experiences.

I shall refer to the combination of theses (T1)-(T3) as *single-domain representationalism* about the phenomenal sense of replacement. Adopting this view in what follows, the account of the sense of replacement to be developed

³ See Chalmers (2004) for distinctions and references.

will be a single-domain representationalist type of account. To develop such an account is primarily to explain how replacement is represented perceptually.

Any explanation of the perceptual representation of replacement faces the challenge of dealing with the following objection. Replacement is change with respect to whether incompatible states in an episode of qualitative change—such as our leaf's being in one location, l_1 , and the leaf's being in another location, l_2 —are in the present. Change requires the persistence of the subject or subjects of change through the episode of change. What persists in the case of replacement? If we assume that replacement is change of incompatible states with respect to the property of being in the present, then the leaf's l_1 -state changes from being in the present to not being in the present as the leaf's l_2 -state changes from not being in the present to being in the present. Figuratively speaking, the leaf's l_2 -state enters the present as the leaf's l_1 -state leaves the present. If replacement thus construed is represented perceptually, then the leaf-states' entering and leaving the present is represented perceptually. As has been pointed out on numerous occasions, however, it is difficult to understand what it could mean for a perceptual experience to represent a state as failing to be in the present.⁴ It seems rather plausible that if the property of being in the present is represented perceptually at all, then every state that is represented perceptually, at any moment, is represented as being in the present. If so, however, then states cannot be perceptually represented as changing with respect to the property of being in the present, and hence replacement cannot figure in the contents of perceptual experiences. In a nutshell, it seems that if replacement is represented perceptually, then so is failing to be in the present. Since failing to be in the present is not perceptually representable, replacement is not perceptually representable, either. I call this *the objection from non-presence*.

In what follows, I shall develop an account of the perceptual representation of replacement, which avoids the objection from non-presence. In Section 2, I shall develop an account of the momentary perceptual representation of the present. This will be the third step in the development of my account of the nature of our sense of flow, presupposing my initial characterization of the apparent sense flow (the first step) and my specification of the type of account to be developed (the second step). In Section 3, I shall employ the account of Section 2 in developing an account of the diachronic perceptual representation of replacement, and I shall indicate how the account avoids the objection from non-presence. This will be the fourth and final step in the development of my account of the nature of our sense of flow. My aim is exploratory. I shall focus on developing an account of an aspect of temporal experience that many have considered intractable, following an unfamiliar path. The construction will take up the rest of the paper. A detailed evaluation will be left as a future task.⁵

⁴ See, *inter alia*, Cameron (2015: 35) and Skow (2015: section 11.2).

⁵ In Sattig (2018), I develop a single-domain representationalist account of the sense of replacement that is structurally similar to the account to be developed here, but which

In order to give my project a bit more context, I shall, as a final preliminary, mention three alternative types of account, by recourse to theses (T1)-(T3). One alternative is to start from the rejection of (T1)—that is, to deny the existence of a phenomenal sense of replacement in our perceptual experiences as of qualitative change. That our perceptual experiences seem to be accompanied by a phenomenal sense of replacement is, according to this approach, a “cognitive illusion”. Starting from this assumption, a *deflationary account* of the apparent sense of flow will take the shape of an account of the nature of this cognitive illusion.⁶

A second alternative is to start from the rejection of (T2) together with the rejection of representationalism about perceptual experience—that is, to accept that there is a phenomenal sense of replacement in our perceptual experiences as of change, but to deny that it is grounded in representational properties of these experiences. An account of the apparent sense of flow starting from this assumption is a *non-representationalist account*.⁷

I view (T1) and (T2) as compelling theses that should rank as default positions, and that should, therefore, not be rejected until alternative types of account have been explored thoroughly. So I shall stick with (T1) and (T2) for the time being and ask whether we can give a non-deflationary, representationalist account.

A third alternative is to start from the rejection of (T3), while accepting (T1) and (T2). Simon Prosser (2016: chapter 6) recently proposed an account along these lines. He holds that our perceptual experiences as of change have a peculiar phenomenal aspect, which he characterizes as the sense that change is dynamic (2016: 160), and that this aspect arises from a certain experiential content. He suggests, moreover, that what grounds the sense that change is dynamic is not an experiential representation of change as being dynamic, but rather a representation of an object as enduring through change (2016: section 6.5), where the notion of endurance is intended to capture that the incompatible object-states constituting an episode of change have strictly the same subject of attribution. Since the sense of dynamicity is here given a representationalist explanation that does not mention dynamicity, we may describe this as a *dual-domain account*, to be contrasted with the single-domain type of account characterized by (T3).

I am sceptical about this type of account. If the experiential representation of an object as enduring through an episode of qualitative change explains the phenomenal sense that this object changes in a dynamic way, then I do not understand the explanation. A phenomenological analysis of the phenomenal sense of “dynamicity”, absent from Prosser’s discussion and most others, might help. I proposed a phenomenological analysis of the explanandum in terms of

differs from the latter in two important respects, to be mentioned at the end; see *n.* 19 and *n.* 20.

⁶ See Hoerl (2014) for a deflationary account.

⁷ See Torrenço (2017) for a non-deflationary, non-representationalist account.

the notion of replacement. This analysis, however, does not make Prosser's explanation more intelligible. I am unable to discern an explanatory bridge from an experience as of a change in an enduring object to the sense that this episode of change undergoes replacement—that is, to the sense that there is a change with respect to whether the states in the episode of objectual change are in the present. Accepting (T3), I shall, in what follows, develop an account of the perceptual representation of replacement, which offers an intelligible single-domain representationalist explanation of the sense of replacement.

2 The synchronic perceptual representation of the present

In this section, I shall sketch an account of how we represent the present in the contents of momentary perceptual experiences. The account will be based on three principal assumptions.

Suppose that a conscious subject, S , has a momentary token visual experience, p_1 , and a simultaneous token auditory experience, p_2 . Both of these experiences have a certain phenomenal character. I shall assume that, in this case, S has a further token conscious state that is *composed* of p_1 and p_2 . This composite has a complex phenomenal character that subsumes the phenomenal characters of p_1 and p_2 . How does composition in the realm of momentary perceptual experiences work? I shall assume that there is an operation of *synchronic experiential composition* that links any plurality of simultaneous, or synchronic, token perceptual experiences, p_1, p_2, \dots, p_n , of the same subject with a single token perceptual experience that has p_1, p_2, \dots, p_n as proper parts, and whose phenomenal character subsumes the phenomenal characters of p_1, p_2, \dots, p_n . We can think of this plurality's interrelatedness by simultaneity and the experiences' having the same subject as the attributes that unify the experiences to form a single whole.⁸ Given synchronic experiential composition, there is a conscious mental state that has *all* simultaneous perceptual experiences of the same subject as proper parts. I shall call a conscious state composed of all of a subject's perceptual experiences at any moment a *synchronic perceptual field* of that subject, at that moment. My first principal assumption concerns the existence of synchronic perceptual fields and will be stated as (A1). For any conscious subject of experience, S , and any moment, t :

⁸ I shall leave open whether a mereologically complex token perceptual experience is less fundamental or more fundamental than its parts. In the former case—defining a view known as *atomism*—synchronic experiential composition generates a whole from parts, whereas in the latter case—defining a view known as *holism*—synchronic experiential composition generates parts from a whole. See Bayne (2010: chapter 10) for discussion.

- (A1) If S has any perceptual experiences, at t , then S has a conscious state—namely, a *synchronic perceptual field*—at t , that is *composed* of *all* of S 's perceptual experiences, at t .⁹

Given that perceptual experiences have representational contents, my second principal assumption concerns the type of content of a subject's synchronic perceptual field. Suppose that S has a token visual experience, p_1 , that represents that a leaf is suspended in mid-air, and that S has a simultaneous token auditory experience, p_2 , that represents that a sound of a bird occurs. By synchronic experiential composition, there is a conscious state, p_3 , that is composed of p_1 and p_2 . What is the content of p_3 ? I shall assume that p_3 represents that a leaf is suspended in mid-air *while* a chirp occurs. That is, I shall assume that the content of p_3 connects the contents of p_1 and p_2 by the relation of simultaneity, and hence the contents of p_1 and p_2 end up as parts of the content of p_3 .¹⁰ Thus, just as the relation of simultaneity holds between the parts of a mereologically complex experience, the relation of simultaneity is represented by that complex experience as holding between the contents of the parts of the experience.¹¹ In short, just as the complex token experience is unified by simultaneity, so is its complex content.¹² Moreover, given representationalism about the phenomenal character of perceptual experiences (introduced in Section 1), the complex phenomenal character of p_3 is, at least partially, grounded in the content of p_3 . Generalizing, I shall assume that for any plurality of simultaneous token perceptual experiences, p_1, p_2, \dots, p_n , of the same subject, such that p_1 represents that state s_1 obtains, p_2 represents that s_2 obtains, ... p_n represents that s_n obtains, S 's conscious state that is composed of p_1, p_2, \dots, p_n represents that a state obtains that connects s_1, s_2, \dots, s_n by simultaneity—namely, the state that s_1 obtains *while* s_2 obtains ... *while* s_n obtains. Moreover, the complex phenomenal character of the composite of p_1, p_2, \dots, p_n is, at least partially, grounded in the content of the composite. This principle about the contents of mereologically

⁹ Principle (A1) comes close to Bayne's (2010: 16) "unity thesis" about the phenomenal unity of consciousness, though (A1) is restricted to perceptual experiences. Bayne (2010: chapter 2) commits to the employment of mereological notions in explaining phenomenal unity, while Bayne and Chalmers (2003) remain neutral on the role of mereology and employ the notion of subsumption throughout.

¹⁰ There are good reasons for holding that the contents of p_1 and p_2 are parts of the content of p_3 , while the content of p_3 does not *represent* the former contents *as* its parts. See Bayne (2010: 30-32) on the "phenomenal bloat" objection.

¹¹ See Callender (2017: chapter 9) for doubts as to whether we have perceptual experiences as of simultaneity, or synchrony.

¹² The contents of perceptual experiences are usually thought to be unified by conjunction. See Bayne (2010: chapter 3) for a characterization and motivation of this thesis. For present purposes, conjunction is too course-grained as a content-unifier, since it is non-temporal. As will become apparent in Section 3, the proposed picture relies on two temporal content-unifying relations, which may be viewed as different forms of conjunction.

complex perceptual experiences also applies to a subject’s synchronic perceptual field. This application is my second principal assumption and will be stated as (A2). For any conscious subject of experience, S , and any moment, t :

- (A2) If S ’s perceptual experiences p_1, p_2, \dots, p_n , at t , represent that states s_1, s_2, \dots, s_n , obtain, respectively, then S ’s synchronic perceptual field, at t , represents that a state obtains that links s_1, s_2, \dots, s_n by *simultaneity*—namely, the state that s_1 obtains *while* s_2 obtains ... *while* s_n obtains.

A conscious subject’s synchronic perceptual field is unified by simultaneity (see A1), and this unity-by-simultaneity corresponds to the unity-by-simultaneity of the perceptual field’s content (see A2). I shall now assume that there is a further aspect of a subject’s synchronic perceptual field that also corresponds to an aspect of its content: its *totality*. A subject’s synchronic perceptual field, at t , is composed of *all* of the subject’s perceptual experiences, at t —a synchronic perceptual field is a *total* experiential state, at a moment. My third principal assumption is that, in correspondence with the totality aspect of a token synchronic perceptual field, the content of a synchronic perceptual field represents that a *total* state of simultaneity obtains. More precisely, suppose that S ’s synchronic perceptual field, at t , is composed of S ’s perceptual experiences p_1, p_2, \dots, p_n , and suppose that these experiences represent that states s_1, s_2, \dots, s_n obtain, respectively. My assumption is that, in this case, S ’s synchronic perceptual field represents that the following state obtains: that s_1 obtains *while* s_2 obtains ... *while* s_n obtains, and *that’s it*. In characterizing this content, I am employing a primitive *restricted totality operator*, “that’s it”. Intuitively, the totality operator expresses that s_1 obtains *while* s_2 obtains ... *while* s_n obtains *while* no other state obtains.¹³ We may think of this representational totality aspect as marking the *boundary* of a complex state of simultaneity. I shall call a total, or bounded, state of simultaneity a *field of simultaneity*—in short, a *sim-field*. The assumption that a synchronic perceptual field represents a sim-field will be stated as (A3). For any conscious subject of experience, S , and any moment, t :

- (A3) If S ’s perceptual experiences p_1, p_2, \dots, p_n , at t , represent that states s_1, s_2, \dots, s_n , obtain, respectively, then S ’s synchronic perceptual field, at t , represents that a *total* state obtains that links s_1, s_2, \dots, s_n by simultaneity—namely, the state that s_1 obtains *while* s_2 obtains ... *while* s_n obtains, and *that’s it*. A total state of simultaneity is a *field of simultaneity*—in short, a *sim-field*.

It should be emphasized that the assumption that a synchronic perceptual field represents a totality aspect amounts to the assumption that a negative component figures in the contents of certain perceptual experiences. This is

¹³ For recent work on the logic and semantics of “that’s it”, see Leuenberger (2014) and Krämer (ms.).

controversial and requires a rather liberal account of the contents of perceptual experiences.¹⁴

Assumptions (A1)-(A3) put me in the position to give an account of the representation of the present in synchronic perceptual experience. I suggest that for the present to be represented in the content of synchronic perceptual experience is for a subject's synchronic perceptual field to represent a sim-field. That is, the present in perceptual experience is the sim-field. The perceptually represented present, at a moment, is the represented total state of simultaneity. Accordingly, to experience, at t , that a certain locational state of a leaf is in the present is not to experience that the leaf-state has a certain intrinsic property. It is rather to have a synchronic perceptual field, at t , that represents a sim-field, such that the latter has the leaf's locational state as a part. Since each perceptual experience of a subject, at a moment, is a part of a subject's synchronic perceptual field, at that moment, if a subject experiences that a state obtains, for any state, then the subject also experiences that this state is in the present. So much for a proposal as to how the present is experienced perceptually, at a moment. The picture is illustrated in Figure 1 for a toy scenario in which a subject has just two perceptual experiences, p_1 and p_2 , at a given moment, namely, a visual experience that a leaf is located in a certain place, l_1 , and an auditory experience that a chirp occurs in another place, l_2 .

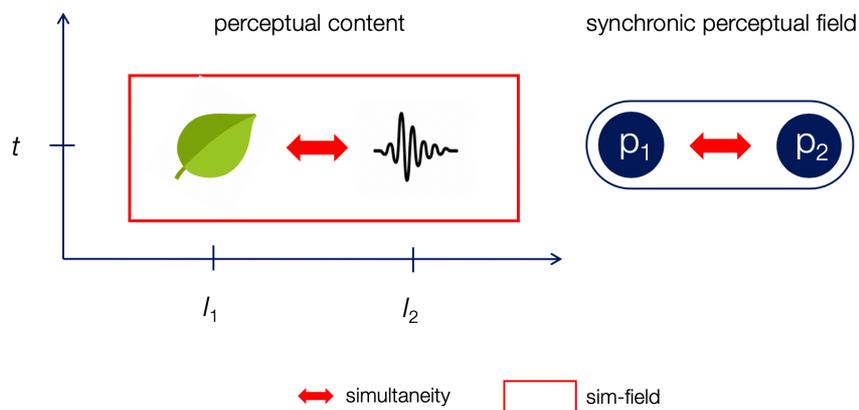


Figure 1: The synchronic perceptual representation of the present

¹⁴ Cf. Siegel (2011) for motivation of a liberal attitude towards the contents of visual experiences.

3 The diachronic perceptual representation of replacement

I shall now turn to the question as to how change with respect to the present is experienced perceptually, with the intention of developing a single-domain representationalist account of our phenomenal sense of replacement. My account of the perceptual representation of replacement will be based on three principal assumptions, (A4)-(A6), which build on (A1)-(A3) from Section 2.

Suppose that a conscious subject, S , has a token synchronic perceptual field, f , and a distinct token synchronic perceptual field, f^* , less than a second later. I shall assume that S also has a temporally extended, or diachronic, token experience that is *composed* of the momentary, non-simultaneous token states f and f^* . Since this is a form of diachronic composition, f and f^* are temporal parts of the composite state.¹⁵ How does diachronic composition in the realm of perceptual experiences work? I shall assume that there is an operation of *diachronic experiential composition* that generates from any plurality of temporally ordered, non-simultaneous synchronic perceptual fields, f_1, f_2, \dots, f_n , of the same subject, S , in the scope of a subjective temporal horizon (see Section 1), a single token state of S that has f_1, f_2, \dots, f_n as temporal parts. The latter state is a diachronic perceptual state. It is important that synchronic and diachronic experiential composition are here assumed to be ordered hierarchically, in that diachronic experiential composition operates on the output of synchronic experiential composition.¹⁶ We can think of the synchronic perceptual fields' having the same subject and occupying the same subjective temporal horizon as the attributes that unify the synchronic perceptual fields to form a single diachronic whole. Analogously to the case of synchronic experiential composition, the phenomenal character of the diachronic composite will be assumed to subsume the phenomenal characters of the temporal parts. I shall call a diachronic perceptual state composed of *all* of a subject's momentary perceptual fields in the scope of a subjective temporal horizon a *diachronic perceptual field* of that subject. My fourth principal assumption concerns the existence and nature of diachronic perceptual fields and will be stated as (A4).

- (A4) For any conscious subject of experience, S , and any subjective temporal horizon, h , of S , if S has any synchronic perceptual fields, during h , then S has a conscious state—namely, a *diachronic perceptual field*—that is composed of all of S 's synchronic perceptual fields, during h .

¹⁵ The view that there are diachronic token experiences that have momentary token experiences as temporal parts is known as *extensionalism*. Extensionalism's main defender is Dainton (2006). Extensionalism's main rival is *retentionalism*, which goes back to Brentano (1988). It is for reasons of simplicity that I am formulating an account of the perceptual experiences of replacement in extensionalist terms. The account can be given a retentionalist formulation as well.

¹⁶ While I remained neutral on the question of atomism or holism regarding synchronic experiential composition (see *n.* 8), I am here assuming atomism about diachronic experiential composition.

My fifth principal assumption concerns the contents of diachronic perceptual fields. Suppose that S has a synchronic perceptual field, f_1 , that represents that a sim-field has a certain qualitative profile F . This profile concerns which qualitative states are linked by simultaneity. Suppose, further, that S has a synchronic perceptual field, f_2 , such that f_2 obtains slightly later than f_1 , and f_2 represents that a sim-field has certain qualitative profile G , where being G differs from being F . By diachronic experiential composition, S has a diachronic perceptual field, d , that has f_1 and f_2 as temporal parts (among other momentary perceptual fields). What is the content of d ? I shall assume that d represents that a sim-field is F *before* a sim-field is G . That is, I shall assume that the content of d connects the contents of f_1 and f_2 by the relation of temporal priority in a way that matches the relation of temporal priority among the occurrences of f_1 and f_2 . The contents of f_1 and f_2 end up as parts of the content of d . Thus, while the content-unifying relation in the case of synchronic perceptual fields is simultaneity, the content-unifying relation in the case of diachronic perceptual fields is temporal priority. In both cases, the temporal relations unifying the perceptual field's contents match the temporal relations among the perceptual field's parts.¹⁷ Finally, given representationalism about the phenomenal character of perceptual experiences, the complex phenomenal character of d is, at least partially, grounded in the content of d . My fifth principal assumption is that a subject's diachronic perceptual field, d , represents relations of temporal priority among the sim-field-states represented by d 's temporal parts, where the represented temporal order of the sim-field-states matches the temporal order of d 's temporal parts. The assumption will be stated as (A5). For any conscious subject of experience, S :

- (A5) If S 's synchronic perceptual fields f_1, f_2, \dots, f_n —where f_1 obtains before f_2 , f_2 obtains before \dots f_n —represent that a sim-field is F , that a sim-field is G , \dots , that a sim-field is H , respectively, then S 's diachronic perceptual field composed of f_1, f_2, \dots, f_n represents that a sim-field is F *before* a sim-field is G , that a sim-field is G *before* \dots a sim-field is H .

My sixth and final principal assumption concerns a further aspect of the contents of diachronic perceptual fields. Suppose, again, that S has a diachronic perceptual field, d , with f_1 and f_2 as temporal parts, where f_1 occurs before f_2 . While f_1 represents that a sim-field is F , f_2 represents that a sim-field is G , where being G differs from being F . I shall assume that d represents that *the same* sim-field is F before *it* is G . For instance, let f_1 represent a sim-field that has a leaf's occupying location l_1 as a part, and let f_2 represent a sim-field that has a bee's occupying l_1 as a part. Then d represents that the same sim-field first has a qualitative profile that links the leaf's occupying l_1 by simultaneity to other states, and then has a qualitative profile that links the bee's occupying l_1 by simultaneity

¹⁷ Simultaneity and temporal priority among states may be viewed as different temporal forms of state-conjunction in experiential content. Recall *n.* 11.

to other states. Generalizing, I shall assume that a diachronic perceptual field represents the same sim-field as persisting and changing in its qualitative profile. This is assumption (A6). For any conscious subject of experience, \mathcal{S} :

- (A6) If \mathcal{S} 's synchronic perceptual fields f_1, f_2, \dots, f_n —where f_1 obtains before f_2 , f_2 obtains before ... f_n —represent that a sim-field is F, that a sim-field is G, ..., that a sim-field is H, respectively, then \mathcal{S} 's diachronic perceptual field composed of f_1, f_2, \dots, f_n represents that *the* sim-field is F before *it* is G, that *it* is G before ... *it* is H.¹⁸

Assumptions (A4)-(A6), made in addition to (A1)-(A3), put me in the position to give an account of the diachronic perceptual representation of replacement. In Section 2, I suggested that for the present to be represented in the content of momentary perceptual experience is for a subject's synchronic perceptual field to represent a sim-field. Building on this suggestion, I now want to suggest that for replacement to be represented in the content of perceptual experience is for a subject's diachronic perceptual field to represent the sim-field as changing. The changing present in the content of perceptual experience is the changing sim-field.

Let me illustrate the picture by reference to the case of the leaf. The leaf's motion from location l_1 to location l_2 is perceptually represented as undergoing replacement in the following way. Subject \mathcal{S} has a diachronic perceptual field, d , with non-simultaneous synchronic perceptual fields f_1 and f_2 as temporal parts, where f_1 obtains before f_2 . While f_1 represents that the leaf is in l_1 while a chirp occurs in l_2 , f_2 represents that the leaf is in l_2 while a bee is in l_1 . Moreover, d represents the following: the sim-field is such that a leaf is in l_1 while a chirp occurs in l_2 , and that's it, before the sim-field is such that the leaf is in l_2 while a bee is in l_1 , and that's it. Thus, d represents that the sim-field, and hence the present, changes with respect to which of the two locational leaf-states it includes. The leaf's l_2 -state is represented as taking the place of the leaf's l_1 -state in the present. Notice that the sim-field is represented as changing with respect to the leaf's locational states only if the representation of the sim-field as including the leaf's l_1 -state rules out the sim-field's including the leaf's l_2 -state as well, and vice versa. The totality aspect in experiential content—here indicated by the totality operator “that's it”—achieves this. According to the proposed account, this is what the diachronic perceptual representation of the leaf's motion as undergoing replacement consists in. The sketched treatment of the leaf-case is illustrated in Figure 2.

¹⁸ When I introduced the notion of a sim-field (see (A3)), I characterized it as a total *state* of simultaneity. By (A6), the sim-field is represented as changing in its qualitative profile. Thus, the total state of simultaneity is to be conceived of as a state that changes with respect to which qualitative states it has as parts. This notion of a variable state differs from the standard notion of a state whose qualitative aspects are invariant.

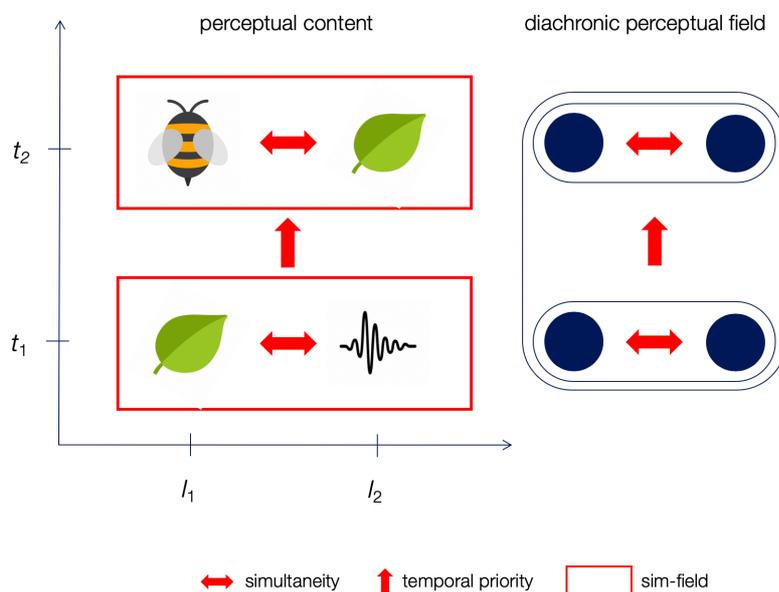


Figure 2: The diachronic perceptual representation of replacement

These are the bare bones of my proposed representationalist account of the phenomenal sense of replacement. In Section 1, I pointed out that any explanation of the perceptual representation of replacement faces the challenge of dealing with the objection from non-presence. If replacement is represented perceptually, then it seems that failing to be in the present is also represented perceptually. But it is eminently plausible that if being in the present is perceptually represented at all, then a state is perceptually represented as being in the present whenever it is perceptually represented as obtaining. Failing to be in the present does not seem to be perceptually representable. This is the objection.

My explanation of the perceptual representation of replacement as the perceptual representation of the sim-field as changing is capable of avoiding this objection. I suggest that the source of the objection from non-presence is the premise that replacement is change of incompatible states with respect to the property of being in the present: the leaf's l_1 -state changes from being in the present to not being in the present as the leaf's l_2 -state changes from not being in the present to being in the present. I suggest, moreover, that the objection is avoidable by analysing replacement in a different way. Replacement, in our leaf-case, is change with respect to the leaf's l_1 -state, its l_2 -state, and the present. What changes here? Our initial response was that the leaf-states change with respect to the property of being in the present. This response, however, is not obligatory. An alternative response is that the present changes from including the leaf's l_1 -state as the unique leaf-state to including the leaf's l_2 -state as the unique leaf-

state. This is a difference concerning the subject of replacement, which is relevant for the question of the perceptual representation of replacement. If the leaf-states are represented as persisting through replacement, they are represented as going from being in the present to failing to be in the present. But if the present is represented as persisting through replacement, no specific leaf-state needs to be represented as failing to be in the present. For the present may just be represented as including the leaf's l_1 -state as the unique leaf-state to including the leaf's l_2 -state as the unique leaf-state. But how does perceptual experience manage to represent the present as changing in this fashion? The account resting on (A1)-(A6) provides an answer: a subject's diachronic perceptual field represents that the sim-field persists and changes in its qualitative profile. If the diachronic perceptual field represents, roughly, that the sim-field is such that the leaf is in l_1 while various states about other things obtain, and that's it, before the sim-field is such that the leaf is in l_2 while various states about other things obtain, and that's it, then the diachronic perceptual field represents that the leaf's motion from l_1 to l_2 undergoes replacement. Since neither the leaf's l_1 -state nor the leaf's l_2 -state is perceptually represented as failing to be linked to other states by simultaneity, the objection from non-presence is avoided.

I shall conclude by pointing out two consequences of the proposed account, with the purpose of elucidating the account further. The first consequence is that our experiences as of replacement-involving change in an object or scene are *fully transparent*. In the case of the leaf, I seem to experience an episode of motion of the leaf as undergoing replacement. According to the proposed account, the sense of replacement in my perceptual experience as of the leaf's motion is completely outward directed. That is, replacement in the content of the perceptual experience is a purely worldly phenomenon, rather than a phenomenon whose occurrence somehow involves a perceptual experience. This is so because replacement is change of the sim-field and the building blocks of sim-field-change are just worldly object-states, simultaneity, and temporal priority.¹⁹

The second consequence is that our experiences as of replacement-involving change in an object or scene are all *illusory*. That is, these experiences do not represent the world as it really is. The reason is very simple. A synchronic perceptual field of a subject, at a moment t , represents a certain plurality of states as being *all* the states that occur simultaneously. These are the states represented by all of the subject's perceptual experiences, at t . But of course no subject ever perceptually experiences all the states that in fact obtain at any moment (relative

¹⁹ By contrast, the single-domain representationalist account of the sense of replacement developed in Sattig (2018) is a higher-order account, according to which a representation of replacement is partly about perceptual experience, and hence inward directed.

to the subject's inertial frame). Hence, our perceptual fields, synchronic and diachronic, are all illusory.²⁰

The conclusion that the sense of flow involves massive illusion will not come as a surprise. It is widely believed that the sense of flow cannot be understood as grounded in experiential contents that represent the world correctly. But there are different paths to this conclusion. A familiar path relies on considerations from the metaphysics of time in establishing the conclusion. It is common to hold that whether flow-involving experiences are veridical depends on whether time really flows, and that for this reason flow-deniers are committed to the non-veridicality of flow-involving experiences. The path taken here, by contrast, does not rely on any considerations about objective temporal flow. The source of the illusion, on the proposed account, is simply that our synchronic perceptual fields misrepresent the size of the plurality of simultaneous states in the world, at any moment, which misrepresentation corresponds to a limitation in our perceptual capacities. Hence, on the proposed account, the sense of flow is illusory whether or not time really flows.²¹

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²⁰ According to the higher-order account of the sense of replacement developed in Sattig (2018), perceptual representations of replacement can be veridical.

²¹ Does it follow that perceptually represented flow—that is, change in the sim-field—has nothing to do with objective flow, if such there be? This depends on which conception of objective flow is adopted. I suggest elsewhere that objective flow can be analysed in terms of the notion of the sim-field. This analysis has the consequence that the flow of time in the world is the same kind of phenomenon as the flow of time represented in experience (on the account proposed here), while perceptual experience misrepresents the scale of the real phenomenon.

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