Time and consciousness

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From Carnap's intellectual autobiography

"Once Einstein said that the problem of the Now worried him seriously. He explained that the experience of the Now means something special for man, something essentially different from the past and the future, but that this important difference does not and cannot occur within physics. That this experience cannot be grasped by science seems to him a matter of painful but inevitable resignation. I remarked that all that occurs objectively can be described in science: on the one hand the temporal sequence of events is described in physics; and, on the other hand, the peculiarities of man's experiences with respect to time, including his different attitude toward past, present and future, can be described and (in principle) explained in psychology. But Einstein thought that scientific descriptions cannot possibly satisfy our human needs; that there is something essential about the Now which is just outside of the realm of science." (Carnap (1963), 37f)

Temporal experiences

Before we start:
perception of time vs. perceptions of things and events in time

Explananda of an account of temporal experience according to Dainton:

1. experience of change, which is as direct as experience of colour or shape
2. phenomenal flow ("distinctive sort of dynamism that is characteristic of *un*changing sensations")

Fundamental aspects of temporal experience, "elementary time experiences", according to Le Poidevin:

1. duration
2. non-simultaneity
3. order
4. past and present
5. change, including the passage of time

Memory-based accounts

- Augustinian conundrum: What are we measuring when we measure the duration of an interval of time?
- Not a past event: past events don't exist and thus cannot have properties
- Not a present event: the present has no duration

$\Rightarrow$ Augustine: it must be in memory.

$\Rightarrow$ memory-based accounts of phenomenal temporality

- Main idea: metrical information (e.g. "the burst of sound was very brief") is derived from tensed information stored in memory about how far in past an event occurred
- inference model: time of event is inferred from information about relations bw event and other events whose time is known

$\Rightarrow$ memory plays important part in accounting for experiences of temporality, but cannot fully do the job by itself, as there could be no direct experience of duration and change otherwise

The pulse theory

- Whiteheadian account: stream of consciousness consist of short pulses of experience of finite duration (pulses correspond to "specious present"), all parts of which are "co-conscious"

$\Rightarrow$ Change, duration, non-simultaneity, order can be directly experienced during a single pulse

- Problem: there should be a difference bw e.g. change within a pulse and change between pulses

The specious present

Definition (Specious present by William James)

"The prototype of all conceived times is the specious present, the short duration of which we are immediately and incessantly sensible." (James (1890))

- James: specious present is bw a few seconds to "probably not more than a minute" $\Rightarrow$ vague

Definition (Specious present)

The specious present *is the interval of time s.t. events occurring within this interval are experienced as present.*

Thesis (Doctrine of the specious present)

"[T]he group of events we experience at any one time as present contains successive events spanning an interval." (Le Poidevin, 3)

- "specious": unlike "objective" present, it is an interval rather than a durationless instant
- Arg 1: Broad (1923): we see things as moving, e.g. second hand of clock
  1. What we see, we see as present.
  2. We see motion.
  3. Motion occurs over an interval.
  4. Therefore, what we see as present occurs over an interval. (Le Poidevin, 3f)

- Problem with Arg 1: we do not see successive positions of moving object as simultaneous (objects would be blurred rather than moving)
- Arg 2: we simply see things as simultaneous when they are not simultaneously presented to our senses
- scientific evidence for Arg 2

The awareness overlap theory

- consciousness consists of an awareness of phenomenal contents

$\Rightarrow$ distinction bw phenomenal contents and acts of awareness

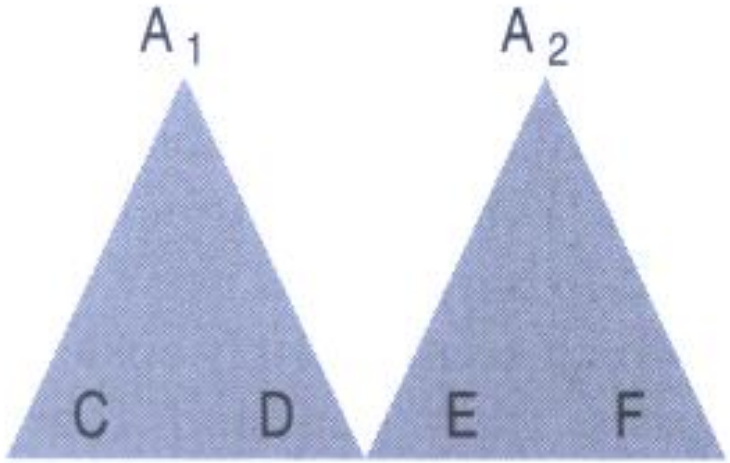

Figure 7.1 Multiple contents falling under single acts of awareness.

- But wait: this runs into the same problem as the pulse thy: there's no experienced connection bw *D* and *E*
- Better: overlap...

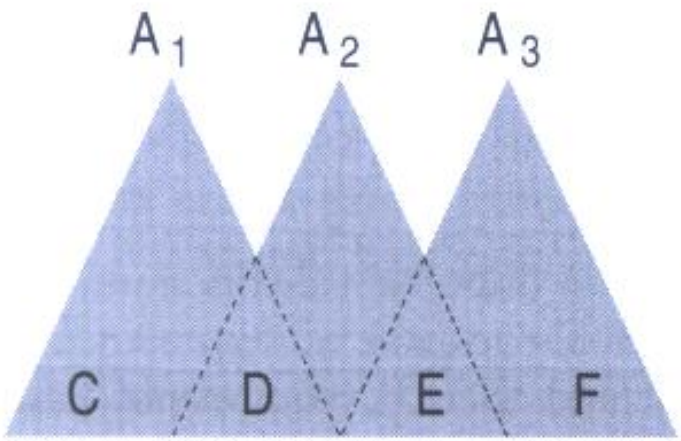

Figure 7.2 The "awareness-overlap" model of our experience of time. Phenomenal bonding is secured by distinct acts of awareness apprehending (numerically) the same items of content.

- Broad (1923): similar model
- The "repeated contents" problem: content events are repeatedly apprehended by successive acts of awareness

The two-dimensional Broad-Husserl model

- a content when initially experienced possesses quality of presentedness to highest degree, and then gradually looses it in subsequent act of awareness
- dynamic character of experience explained by two-dim time (cf. Fig. 7.3 on next slide): earlier-later odering of acts of awareness ($A_1 - A_9$), and earlier-later ordering of contents presented to these acts (e.g. in A_6 this runs from c to H)
- according to two-dimensionalists, the "specious present consists of a momentary awareness with a complex content that *seems* temporally extended" (Dainton, 100)
- but isn't: the instantaneous present just "reverberates" in mind
- "This slippage of contents into the phenomenal past creates the impression that our immediate experience is advancing into the future." (ibid)

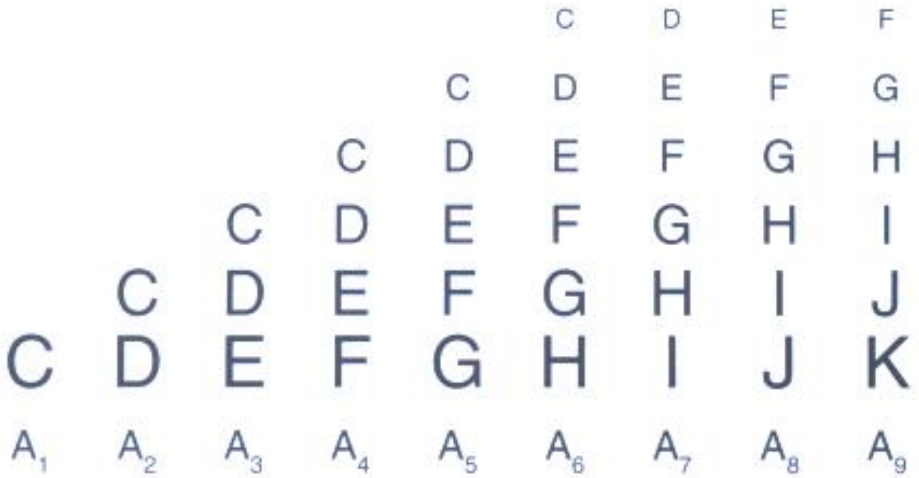

Figure 7.3 The two-dimensional (Broad-Husserl) model of temporal experience. The same experiential contents (in this case brief tones) are apprehended as possessing different degrees of "presentedness" in successive acts of awareness.

Three problems

1. phenomenological inaccuracy: experiences don't always linger on, and our consciousness is not choked with residues of recent experiences
2. problematic presentedness: transitory intrinsic property or simply measure of intensity of experience? Either way: unclear what "presentedness" is
3. consciousness fragmented: account is atomistic (isolated, momentary awarenesses constitute distinct episodes of experiencing), doesn't accommodate reality of phenomenal binding

The simple overlap theory

Position (Simple overlap theory)

The act of awareness of change are not momentary, but temporally extended themselves. They have precisely the same duration as their contents and overlap considerably. In fact, they are identical with their contents: phenomenal contents are intrinsically conscious and thus directly apprehended.

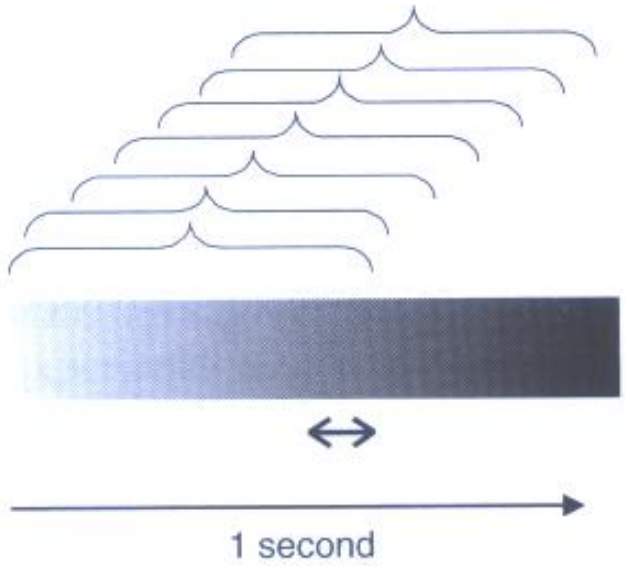

Figure 7.7 Observing a light fade. Many overlapping experiences are involved in even a brief phase of a typical stream of consciousness.

Diachronic co-consciousness

The simple overlap theory requires relation of co-consciousness:

- not only synchronic co-consciousness of (simultaneous) events, but also diachronic co-consciousness of events separated by brief lapse of time
- relation of co-consciousness if not transitive (Why not?)
- but it's surely symmetrical

$\Rightarrow$ If relation is symmetrical, then why does our consciousness *flow* in particular direction?

- only solution: "the contents that are symmetrically joined by co-consciousness must themselves possess an inherent directional dynamism." (Dainton, 105) $\Rightarrow$ immanent flow (e.g. I see the bird *moving*)

Simple overlap theory in sum

- "We are directly aware of change because co-consciousness extends over time.
- "The specious present is of short duration because co-consciousness extends only a short way over time and is not transitive (at least in the diachronic sense).
- "Consciousness flows in a particular direction because phenomenal contents possess inherently dynamic and directed contents." (Dainton, 105)

Consequences of the simple overlap theory

- incompatible with two forms of presentism: momentary solipsistic presentism and many-worlds presentism
- so far compatible with both the static block (detenser) and the dynamic block (growing universe)
- not only compatible with dynamic compound presentism, "but in some ways... a precise analogue of it." (Dainton, 109)

$\Rightarrow$ we can rule out two of five models as discussed by Dainton
$\Rightarrow$ Important: static block not ruled out!

Detensers feel the flow of time

Thesis (Explanatory sufficiency of the block universe)

The block universe posited by detensers contains the resources to explain the experience of temporality. Of course, the detensers' philosophy of time will have to be augmented by a lot of research in cognitive neuroscience to offer such an explanation. But the resulting explanation will not involve an objective global present.

So let me sketch a detenser's reply to the strong intuitions that are often cited in support of the tenser's belief in an objective global present.


Jeremy Butterfield, "Seeing the present", *Mind* **93** (1984): 161-176.


Nick Huggett, *Change: What Physics can Teach Philosophy and (vice versa)*, book manuscript, Chapter 11.

The problem restated, once again

Question

"[W]hy do we experience variation over time as dynamical *or active—as* change*—while variation over space alone seems inert and static—as* mere variation*? Given the similarity between space and time in a block universe like ours, it's a puzzle how this striking difference could arise." (Huggett, 97)*

So what, if any, are the differences bw space and time in a block universe?

1. play different roles in laws of physics
2. asymmetries in way things are distributed in block universe $\Rightarrow$ difference not of space and time, but of things in space and time

The speed of light and its effects

Law

The speed of light is roughly 300,000,000ms^{-1}.

This law has significant consequences:

- so given the light speed as speed of causal signals, 1s compares to 300,000,000m
- people extend much further in time than in any spatial dimension: perhaps 2,500,000,000s compared to 1m$\times$1m$\times$2m

A further assumption

Axiom (Physicalism light)

What we experience depends on what happens in our brains.

⇒ Strategy: seek explanation of experience of temporality in terms of brain and its interactions

- brain contains representation of the world, i.e. the state of the brain depends on how the world is
- idea: explain different experiences of space and time in terms of the representational function of brain

Question (Mind-dependence vs mind-independence)

What's the brain's contribution to the experience of temporality—and what the outside world's contribution?

Why time seems to flow

Two questions:

1. What spatiotemporal parts of the worldline of my brain contain representations?
2. What spt parts of the block universe do they represent?

We know:

- range of attention in moment-to-moment interaction with world (knives, balls, people, buildings): $\sim$100m
- light signals reflects off objects within 100m arrive almost simultaneously

$\Rightarrow$ Light reaching me at any instant comes from an instantaneous region of space.

- time lag bw light impinging on my retina and representation in my brain: $\sim$0.5s
- individual representations in brain last $\sim$1/1000s

To answer the question on previous slide:

1. (visual) representations occupies a spt region the spatial size of my brain times about 1/1000s in duration
2. represents an instantaneous region of space of $\sim$100m radius

Huggett concludes:

"Therefore... the worldline of my brain contains a temporal series of (fairly short) representations of the arrangement of things in space at an instant... I suggest that it is our awareness of each experience as being just one on the series of different experiences over time that explain our sense of temporal dynamism... Ultimately, time is related to us differently than space is, since our experiences are of a temporal series of spatial experiences, not the other way around." (Huggett, 100)

Missing piece: the mind

Let's return to the question:

Question (Mind-dependence vs mind-independence)

What's the brain's contribution to the experience of temporality—and what the outside world's contribution?

So far, mind has been left out of detensers' answer to challenge
$\Rightarrow$ let's study the mind's contribution to constructing the present.

Sneak peek:

- picture emerging from research in cognitive neuroscience and allied disciplines: mind employs "temporal integration mechanisms"

Craig Callender, "The subjectivity of the present", manuscript.

Methodology

Principle (Mill's Joint Method of Agreement and Difference)

"If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance; the circumstance in which alone the two sets of instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon." (A System of Logic, *III.viii.4*)

Example: four people have a picknick, two of them get sick

	River	Pudding	Beer	Sun	healthy
Alice	Y	Y	Y	Y	N
Bob	N	N	Y	N	N
Catherine	Y	Y	N	Y	Y
Derek	N	N	N	N	Y

$\Rightarrow$ Inductive inference: the beer caused the sickness

In our case:

- manipulate minds while holding "world" fixed and see if (and how) experience changes
- manipulate "world" while holding minds fixed and see if (and how) experience changes

Experiment: the window of simultaneity

Experimental set up: subject wears headphones, listens to tones lasting for 1ms

Findings:

- If left and right tones are simultaneous, subject does not hear two tones but only one fused tone.
- If tones are not simultaneous but close together at 2ms apart, subject still fuses both tones together.
- If time lapse bw tones is bw 3ms and 20ms, subject hears two tones, but is unable to determine which one came first.
- If time lapse is $>$ 20ms, subject can discern which came first.
- The window of simultaneity varies from person to person, from 2ms to 5ms.
- Similar results apply to other senses: fusion window is up to 10ms for tactile sense, 20ms for vision.

Visual and auditory reactions

- Problem: connect multisensory signals into subjectively simultaneous whole
- Example: simultaneous sound and light from same source
- First Effect: different propagation speeds $\Rightarrow$ visual signal faster
  - speed of light: 300,000,000ms^{-1}
  - speed of sound: 330ms^{-1}
- Second Effect: different transduction speeds $\Rightarrow$ auditory signal faster
  - sound transduction by hair sells of inner ear many times faster than phototransduction in retina
- Third Effect: different neural transmission speeds $\Rightarrow$ auditory signal faster
  - transmission takes more time from visual cortex to cerebral cortex than from auditory cortext to cerebral cortex

How do these three effects combine?

⇒ ∃ "point of subjective simultaneity" (PSS) at roughly 10-15m creating two regions:

1. vicinity (up to 10-15m): auditory signal faster
2. distance (more than 10-15m): visual signal faster (lightning and thunder)

- PSS is highly observer-specific (Stone et al 2003)
- PSS is very stable for each individual

⇒ If you accept these experimental findings and want to argue from experience to the reality of a mind-independent present, then you must explain why your PSS is so special, and not mine.

Dynamic temporal integration mechanisms

Since we are able to bind together events over a much broader range than just bw 10m and 15m, we need device that matches signals from multisensory event: "dynamic temporal integration mechanism"

Ernst Pöppel (German neuroscientist) has posited them some time ago:

"... our brain furnishes an integrative mechanism that shapes sequences of events to unitary forms... that which is integrated is the unique content of consciousness which seems to us *present*. The integration, which itself objectively extends over time, is thus the basis of our experiencing a thing as present... The *now*, the subjective present, is nothing independently; rather it is an attribute of the content of consciousness." (Pöppel, *Mindworks: Time and Conscious Experience*, Harcourt, Boston (1988), 62f)

Salvation for the detenser

"Just as the detenser can tentatively point to thermodynamics, radiation, special initial conditions, etc., to account for our asymmetric experience of past and future, so too can a detenser point to mechanisms in cognitive neuroscience to explain the experience of the present." (Callender, 24)

Callender (a detenser) concludes:
"When we turn to... empirical study... we find fascinating results that certainly appear relevant to philosophy of time; in particular, coupled with some philosophical reflection, this work indicates that tenseless time is more in tune with experience than tensed time." (3)

"...when examined carefully, we... see that the hypothesis of an objective present is more or less explanatorily impotent. The objective present cannot explain most of the data regarding our subjective present; moreover, there are tenseless resources that do." (10)

Conclusion

In sum, the case that the experience of a flow of time emerges from the way the mind produces experience rather than from a mind-independent moving now is much stronger than anticipated.