Salience: The Dynamics of Attention
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The Stream of Consciousness
The Stream of Consciousness
Involuntary Attention

- You are attending to something involuntarily \textit{iff} (roughly) you are attending to it \textit{not because} you want to, decided to, intended to, are trying to, etc.

- \textbf{Examples}:
  - an object, property or event in your environment catches or grabs your attention.
  - your attention drifts or wanders to an object, property or event in your environment.
  - a mental image, itch or pain grabs your attention (or “pops into your head”)
  - Your mind wanders to unbidden thoughts, ideas, images, itches, pains, etc.
Involuntary Attention and Salience

What distinguishes voluntary attention (vA) and involuntary attention (iA)?

First Try:

The (constitutive) cause of vA is a personal level mental state, whereas the (constitutive) cause of iA is sub-personal (assimilate iA to passive reflexes).
Involuntary Attention and Salience

Problems:
- unlike with reflexes, you are (involuntarily) attending (while you are not moving your leg: it moves)
- unlike with reflexes, there is certain kind of answer to “why are you attending to it?”
- the type of answer (roughly): it caught my eye, it grabbed me, it struck me, I felt drawn to it, etc.
- misses the phenomenology of feeling drawn to something, something’s striking you, etc.:
  - the objects of involuntary attention are (relatively) salient for you when they grab your attention, or when your attention drifts to them
Involuntary Attention and Salience

Alternative: The Salience Account of iA

What (constitutively) causes iA is something’s being (relatively) salient for you (an encounter of salience), which is a specific type of personal level conscious event.
Involuntary Attention and Salience

- **Salience (here):**
  - roughly what causes you to attend to something.
  - **NOT:** how something is when you attend to it. What doesn’t “pop out” is not salient even when you decide to attend to it.

Find the man in the upper right hand corner and focus your attention on him!
Involuntary Attention and Salience

*My goal:* provide a personal-level account of encounters of salience

- what type of conscious event are they?
- how is their phenomenal character to be explained?
- in what sense do they drive the flux of consciousness?
- what can be said about iA from within the stream?
Salience Maps

- A related sub-personal, neuroscientific proposal/finding:
  - there are salience maps in various parts of the cortex that function as control mechanisms for (especially involuntary) attention.*

- In particular such maps have for example been extensively described in the Posterior Parietal Cortex (PPC). Its homologue in the monkey (the Lateral Interparietal Cortex, LIP) has been extensively studied electrophysiologically.**


**See review in Gottlieb (2007)
Salience Maps
Salience Maps

- LIP salience maps:
  - receive both bottom-up as well as top-down input:
    - are modulated by low-level stimulus features, as well as task-relevance, familiarity, etc.*
  - contain a “sparse” representation of the visual environment (i.e. strong response only to contextually relevant/salient stimuli within the receptive field).*
  - strong(est) activity predicts and precedes attention shifts (and saccades) to where the area/neuron codes for.**
  - There is inhibition for locations that are already attended.***

*** e.g. Balan and Gottlieb (2006).
“[...] LIP provides a “salience representation” of the external world – a topographic visual representation that encodes the locations of salient or behaviorally relevant objects. Recent neurophysiological experiments show that this salience representation incorporates information about multiple behavioral variables – such as a specific motor response, reward, or category membership – associated with the task-relevant object.”

(Gottlieb (2007, p. 9)).
Salience

- In contrast to Gottlieb, some neuroscientists and psychologists use the word “salience” to refer to a purely bottom-up, relatively low-level stimulus property. This property is task-independent, categorization-independent, familiarity-independent, etc.

- This is not what I here mean by salience!

- The low-level property contributes, and impacts salience in my sense, but does not exhaust it.

- What I mean by salience is something that is in common between all cases of iA (no need to fight over words, I could have used “prominence” or just “P”.)
Encounters of Salience

- Saliency (in the general case) is ascribed to mind independent objects (which may include contents)
- What is common between all cases where something is salient (for you)?
- They seem to be a highly diverse bunch.
- Salience, in my view, needs to be highly relativized
Encounters of Salience

- Their salience is context-relative. What is salient in one context need not be salient in another.
- Their salience is also subject-relative. What is salient for me need not be salient for you.
- Their salience also depends on the way they are given to you (how they appear to you): the same object might (for example) be visually salient, but not auditorily.
Encounters of Salience

- Salience comes in degrees: the tiger is more salient than the camera shutter, and the man with the camera more than the trees, etc.

- Salience depends on a contrast class. In the case we are interested in, roughly everything you are aware of at the time.

- Overall then:

  In context con, x is salient to subject S to degree d relative to contrast class C when given to S in way w
Salience and Salientishness

- The features of salience mentioned above are, in my view, best explained by taking salience as a response-dependent property in the following sense (this is another argument for the phenomenal view of salience argued for briefly and suggested on slides 6/7):

  An encounter of salience of consists in having an experience with a certain phenomenal character, which I will call salientishness.

- Salientishness is ascribed to experiences, not to mind-independent objects.
Salience and Salientishness

All this more precisely (and probably confusingly):

In context con, x is salient to subject S to degree d relative to contrast class C when given to S in way w

in virtue of the fact that

in con, S has a total (perceptual, visual?) experience of C in which her experience of x as appearing in way w is relatively salientish to degree d.

For example:

The tiger is salient (in the context ...) in virtue of the fact that in that context your experience of the tiger (where it appears stripy, orange, etc.) against the background of all your other experiences is relatively salientish.
So, to summarize

- You i-attend to something because it is salient for you.
- Something is salient for you in virtue of your experiencing it in a certain way.
- In particular, it is salient in virtue of your experience having a certain phenomenal character, salientishness, that experiences may have to a higher or lower degree.
Salience and Salientishness

Towards salientishness

- When you hallucinate you will still have a salientish experiences as of something (the *intentional object* of your experience), even though there might not actually be nothing that is salient.
- We don’t know yet in virtue of what experiences have salietishness. Maybe it is because they have a certain content, maybe not.
Constraints on Salientishness

- **First Constraint:**

  Salientishness comes in degrees
Constraints on Salientishness

First Constraint:

Necessarily: if you salientishly experience $x$, then you are disposed to attend to $x$.

Some phenomenal characters *often* cause iA: a red-ish experience in a total overall green-ish experience, a loud-ish experience, etc.

But it is possible to have experiences with such phenomenal characters that did not cause iA.

By contrast: it is essential to having a salientish experience of $x$ that you are disposed to attend to $x$. 
**Constraints on Salientishness**

- **Second Constraint:**
  
  There is no descriptive property $D$ such that you have a salientish experience of $x$ in virtue of experientially representing $x$ as $D$.

- One reason: $D$ would be a oddly relativized property

- Another reason: unlike, say, redness, $D$ doesn’t phenomenally seem to be a property experience represents.

- The main reason, though, comes from the first constraint: for any descriptive property, someone could have an experience that represent $x$ as $D$, and yet she is not disposed to attend to $x$ (*the Humean Argument*)
Constraints on Salientishness

- Compare: there is no descriptive property D such you desire x in virtue of experiencing/believing that x is D.

- 1st Caveat: how about the property being desired by you (and correspondingly: being salientishly experienced by you)? This property is ruled out by the clause in virtue of in the third constraint.

- 2nd Caveat: how about the property being desirable? I think that Humean arguments show that if it is to explain your desiring x, x’s being desirable can’t be a descriptive property.
Constraints on Salientishness

- An intellectualist response to Hume’s argument: being desirable = being good or desire-worthy (i.e. a normative property)

- The idea applied here: you have a salientish experience of x in virtue of experiencing x as worthy of attention (The Normative Account)
Third Constraint:

There is no normative property $N$ such that you have a salientish experience of $x$ in virtue of experientially representing $x$ as $N$. 
Constraints on Salientishness

An Argument against the Normative Account

1. If you experience x as F, and believe that x is not F, then your experience contradicts your belief.

2. If the Normative Account, then if you believe that x is not worthy of attention, you experience x as F and believe that x is not F.

Thus, 3. If the Normative Account, then if you believe that x is not worthy of attention, your experience contradicts your belief.

But, 4. A salientish experience of x does not contradict your belief that x is not worthy of attention.
Constraints on Salientishness

- **Fourth Constraint:**
  
  There is no (conative) attitude \( \phi \) such that you have a salientish experience of \( x \) in virtue of \( \phi \)-ing to attend to \( x \). (where \( \phi \)-ing = desiring, deciding, trying, etc.)

- Follows from the definition of \( iA \) and the first constraint.

- Is also highly intuitive: phenomenal perceptual salience is perceptual, and doesn’t come from somewhere else.
Salientishness as Experiential Potential

Video from Laurent Itti’s lab: http://ilab.usc.edu/bu/movie/index.html
Salientishness as Experiential Potential

Formal Procedure (roughly try):

- Divide your total (perceptual, visual?) experience into parts:
  - \( E = \{e_1, e_2, e_3, \ldots\} \)
- Rank the parts by their likelihood of a shift of attention to the object of that part of experience. We get an ordered sequence of experiences.
  - \( E = <e_3, e_7, e_1, \ldots> \)
- Shift the focus of attention to the first member in that sequence
Salientishness as Experiential Potential

For Image-like Experiences
Salientishness as Experiential Potential

For non-Image-like Experiences

Tiger-experience

Red-stone-Experience

Wood-Gist-Experience

Water-sound-Experience

Man-experience
Salientishness as Experiential Potential

- Interpretation:
  - Experiential resistance: experiences don’t like to be peripheral, they want to be at the center of attention. The salientishness of an experience measure *how much* an experience resists peripherality. → too metaphorical.
  - Experiential desires: think of an experience \( x \) itself as a desire to attend to \( x \). To see a tiger *is* to want to focus on the tiger. → floats fourth constraint.
  - Experiential Besires: the conative (desire-like) aspect of experience, and the presentational aspect of experience are not yet separated. A tiger experience is both an appearance of tiger-like properties and a push towards centrality (Pushme-Pullu-Representations (Millikan))
Salientishness as Experiential Potential

- Problem: ranking might *force* structure that need not be there:
  - e7 and e3 might be equally salientish.
  - Maybe relative salientishness is not necessarily transitive?

- Improvement: take ‘*has more experiential potential than*’ as the primitive; then introduce constraints on the resulting relational structure as needed (plausible: totality).

- In *us* there might be *more* structure: maybe experiential potentials can be mapped to the reals, i.e. we can speak of degrees of experiential potential.
Salientishness as Experiential Potential

Side-notes:
- think of salientishness structure as measuring the conative force of experience, and of (what in earlier work I have called) peripherality structure as measuring the presentational force of experience.
- Presentational force and conative force are constitutively interconnected: experiential potentials pull at the peripherality structure, and warp it.
Salientishness as Experiential Potential

- **Salientishness structure**: experiences have salientishness only
  - (a) compared to other experiences
    - That is: the primitive notion is only experience being more (or less) salientish than some other experiences.
    - So: (my account of) salientishness implies the falsity of a form of *synchronic atomism* about experience, i.e. salientishness structure characterises experience only as a whole.
  - (b) as a function of the temporal evolution of experience.
    - That is: salientishness *at a time* is essentially linked to how your experience changes *over time*.
    - So: (my account of) salientishness implies the falsity of a form of *diachronic atomism* about experience, i.e. the claim that there are no essential links between how your experience is at different times.
Concluding Thoughts

What I have argued:

- iA is attention that is constitutively caused by salientish experiences.
- Salientishness is experiential potential.

If my account is correct then:

- Experience has both presentational and conative aspects.
- Experience is synchronically holistic.
- Experience is diachronically holistic.
Concluding Thoughts

**Unifying iA and vA:**
- I have started by distinguishing iA from vA. Only in the latter case you are attending to something because you are trying to, intending to, etc.
- But, in fact, the salientishness account can be extended to vA: in the case of vA your intentions, goals, tryings, etc. have a strong impact on the salientisheness structure of your experience.
- Given what we know about the strong interaction between iA and vA, and about the integration of bottom up and top-down influence in PPC salience maps, such a unified account might be desirable.
Concluding Thoughts

Back to the Stream:

- If what I have said is right, experiences intrinsically resist peripherality, they want to be central.
- This intrinsic dynamic drives the stream of consciousness along.
- This is further backed up by empirical research that shows that the salience of x tends to decrease when x is already the focus of attention.
- That consciousness cannot “hold itself still” (Wegner) might be a purely empirical fact (though I am open to suggestions about why it might be essential). But it is a fact that forces us to reconsider crucial aspects of what consciousness (in us) is.
The End