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Is there an empirical case for semantic perception?

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ABSTRACT
I argue that results in perception science do not support the claim that there is semantic perception or that typical, unreflective utterance comprehension is a perceptual process. Phenomena discussed include evidence-insensitivity, the Stroop effect, pop-out, and adaptation – as well as how these phenomena might relate to the function, format, and structure of perceptual representations. An emphasis is placed on non-inferential transitions from perceptual to conceptual representations, which are important for debates about the admissible contents of perception more generally.

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1. Introduction

Is there semantic perception? (Do we 'hear meaning'? Is utterance comprehension a perceptual process?) Explorations of this question have drawn on considerations from a variety of sources, including epistemology, phenomenology, and semantics (e.g. Fricker 2003; Siegel 2006; Pettit 2009; O'Callaghan 2011). Here I focus on experimental results drawn from perception science.

The question of semantic perception is significant for a variety of reasons. Two that are especially relevant for this paper are its bearing on the admissible contents of perception debate and its upshot for recent attempts to use perception science to identify a joint between perception and cognition.

Regarding the admissible contents of perception: Semantic perception would of course enlarge the list of properties represented in perception. But it would do so in two particularly interesting ways. First, it would add to the list properties expressive of mental states and thus would

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contribute to theorizing about mindreading. Candidate perceptual contents already include agency and certain emotions (or their expression). But, because semantic perception involves the attribution of specific contents (they are perceptions as of a speaker, sentence, or utterance's meaning *that such-and-such*), semantic perception would greatly increase the range, complexity, and specificity of perceptually represented properties expressive of mental states. Second, semantic perception would seem to enlarge the list well beyond just linguistic content: it would apparently add all the properties we can understand someone to have said something about – including, being a prime number, expensive, or just. At least it would seem to do so pending commitment to some view of perceptual indirect speech attribution on which perceptually attributing an assertion that 17 is prime does not involve perceptually representing the property of being prime (cf. fn. 14 below). *Representing* the property of being prime is not necessarily *attributing* the property of being prime (in the example, what's attributed is an attribution of being prime). So, semantic perception would also give us reason to likewise distinguish two senses in which a content may be admissible in perception: as something that can be represented or as something that can be attributed.

Regarding whether perception science has identified a joint between perception and cognition: Whether there is semantic perception depends in part on what should count as perception. The question of a joint and the question of semantic perception can be approached in tandem by asking whether utterance comprehension tends to share features that cluster with uncontroversial cases of perception and not with non-controversially non-perceptual processes and states. As in inquiry generally, implementing this strategy might point towards a classification of utterance comprehension as perceptual or not, but it also could lead to a revised conception of perception and thus of the perception-conception distinction. I am particularly interested in these possibilities as they arise for recent work that aims to illuminate what perception is by adverting to perception science. Prominent examples include Burge (2010) and Block (2014; forthcoming). This work turns to perception science to identify compelling marks and fundamental explanatory features of perception. It is a natural strategy to apply such an approach to the particularly intriguing and unobvious case of utterance comprehension. As we will see, it has indeed been argued that utterance comprehension exhibits features commonly taken to be compelling marks of the perceptual in the perception science literature – such as susceptibility to pop-out and to adaptation. But it is also the case that utterance

understanding exhibits features that have been taken to indicate non-perceptuality – such as discursiveness, conceptuality, and propositionality. The latter features are in fact implicated in the particular ways semantic perception would enlarge the admissible contents of perception noted above. But the further significance I mean to indicate here is that semantic perception, if there is such, because of its particular mix of features, would force a reconsideration of prominent ways of understanding the joint between perception and cognition, perhaps threatening the existence of such a joint at all.

The person who has done the most to bring considerations from perception science to bear on the question of semantic perception is Brit Brogaard (2017, 2020). She argues that utterance comprehension possesses a variety of features that would group it with clear cases of perception. Part of my discussion examines aspects of her case for this positive answer. I suggest that some of the considerations she provides do not tell between perceptions and perception-based cognitive states. Other of her considerations – susceptibility to pop-out and to adaptation – would indeed tell in favor of semantic perception, but the evidence is not yet compelling. I then more briefly discuss discursiveness, conceptuality, and propositionality. The verdict is that we lack reason to deem utterance comprehension perceptual. I conclude with some questions regarding what *is* perceptual in utterance comprehension, how utterance comprehension transitions from the perceptual to the conceptual, and where inference enters in.[1]

2. Perception and non-inferential conceptualization

Many have noted that utterance comprehension shares features with perception. Burge, for example, writes:

> As with perception, and comprehension of own's speech, the processes underlying domestic understanding of others are fast, unconscious, difficult to articulate, nearly automatic, almost modular, and very reliable in ordinary contexts. (1999, 240)

[1]In what follows, I mostly elide (or, attempt to remain largely neutral on) some important issues. Just what aspects of content are supposed to be perceived in utterance comprehension: what is said, explicature, some implicatures as well? (I will assume that lower-level semantic features cognitively inaccessible except via reflective theorizing and empirical investigation, such as Pietroski's (2018) instructions to construct a concept, are not at issue.) To what is the content supposed to be attributed in perception: a speaker, a sentence in context, an utterance? How finely is the attributed content individuated? What speech acts are supposed to be attributable in perception – presumably at least asserting, asking, and ordering, but also more, or more finely delineated, speech acts?

It is thus natural to consider whether utterance comprehension *is* a kind of perception. But one must also ask whether such features are shared by some *non*-perceptual processes. That possibility is sometimes occluded by a tendency to frame debates about utterance comprehension as between a semantic perception view and a view of utterance understanding as involving inference (Brogaard 2017, 2018, 2020 – though cf. the last paper's concluding section). This framing omits an intermediate possibility of non-perceptual, non-inferential processes. That there are such processes, and that they can share some features of perceptual processes, is clear: post-perceptual associative transitions, for example, can be stimulus-driven, fast, nearly automatic, etc. Indeed, according to Burge (2010, 2020) and Block (forthcoming), transitions generally from perceptual states to conceptual states, not only can be, but always are non-inferential. This follows from their view that perceptual states are nonconceptual and non-propositional, but inferences are transitions among conceptual, propositional states. And, again, these non-inferential transitions from perceptual to conceptual states can be stimulus-driven, fast, nearly automatic, etc., as when one has a perception as of something moving and then conceptualizes it as moving. Note that the conceptualized state yielded by this transition needn't be a belief; it may be a 'seeming' or some similarly less committal state.[2] Finding features that distinguish the percept and the resulting conceptual state is thus a subtle matter, difficult to resolve from the armchair. This is among the reasons that both Burge and Block rely heavily on results in perception science to make progress in identifying a joint between perception and cognition and resolving questions about the admissible contents of perception.

The possibility thus arises that utterance understanding – though stimulus-driven, fast, nearly automatic, etc. – may likewise involve non-perceptual, non-inferential processes. In the rest of this section, I suggest that some of the considerations Brogaard advances in favor of semantic perception – stemming from evidence insensitivity, the Stroop effect, and semantic priming – are not compelling in part because of this possibility. (The section after takes up some considerations she

[2]Block (forthcoming) calls such states perceptual judgments. I avoid this terminology for two reasons. First, it courts confusion: such judgments are not part of perception, but perception-based. Second, some understand judgments to be occurrent beliefs and thus committal. Also, Block seems to assume that perceptual judgments causally precede beliefs. There is room to question this – for example, from a Spinozan perspective on belief formation (Gilbert 1991; Mandelbaum 2014). A remark also on automaticity: There are various notions one can distinguish – for example, a process can be involuntary but require a certain kind of attention (see Section 2.2 on Stroop interference below). I won't take the matter further here. See Palmeri (2003) for discussion.

offers that hold out the potential to avoid this worry.) It's left open whether utterance comprehension *also* involves inference. I briefly return to that question in section 5.

2.1. Evidence insensitivity

The string 'More people have been to France than I have' seems meaningful to many people, and this illusion persists even after they realize the string is incomprehensible (Wellwood et al. 2018). (Azzouni (2013) emphasizes different sorts of evidence-insensitivity cases, such as variants of Putnam's (1981) ants which happen to form shapes indistinguishable from linguistic tokenings. See also Pettit 2002.) Brogaard (2017, 2020) suggests that this sort of evidence insensitivity provides reason to think meaningfulness is represented in perception, since evidence insensitivity is a hallmark of clear cases of perceptual illusion. Indeed, evidence insensitivity suggests a form of informational encapsulation, or at least cognitive impenetrability, core to the kind of modularity often considered prototypical of perception. Brogaard recognizes that to claim that we perceive something as meaningful is not yet to claim that we perceive it as having a particular meaning. But she maintains that such cases provide reason to think specific meanings are represented in perception to the extent that the perception of meaningfulness depends on perceiving specific meanings.

One might try resisting this suggestion on various grounds. For example, as Brogaard is aware, the France sentence itself shows that representing something as meaningful need not depend on representing it as having a specific meaning; and so one might question the dependence on which Brogaard's suggestion rests.[3] For another, there are non-perception-based examples of evidence insensitivity. For example, the Naïve Comprehension Schema can still seem 'intuitive' even after one understands Russell's Paradox (Bealer 1992). A rather different case might be evidence-insensitive religious attitudes (Rey 2007).

[3]While being meaningful requires having a meaning, it's a distinct question whether perceiving something as meaningful requires perceiving it as having some specific meaning. The general Humean principle that perceiving a determinable requires perceiving a determinate should be rejected. But restricted versions could hold, perhaps as a nomological matter. In the case at hand, however, a perception of meaningfulness (if there is such) could be driven, for example, by the perceptual representation of lexicality or of lower-level semantic features. (That said, it is also plausible that the 'More people have been to France' case involves representations of higher-level meaning *fragments*. The proponent of semantic perception could try arguing that *they* are perceptual and drive the perception of meaningfulness. One would need to see what the argument is to know if it escapes the replies presented in this article.)

But the point I want to make here is that the non-inferential transition from percepts to conceptualized states opens the door for perception-based conceptual states that are evidence-insensitive. I develop the point in terms of seemings (cf. Brogaard 2012). Consider, for example, a visually-based seeming – a conceptual state – with the content that those lines (in fact, Müller-Lyer lines) are different lengths. This state is evidence-insensitive: it can persist even after one measures the lines. In this case, what best explains the persistence is that the lines are represented in vision as being of different lengths, together with the nature of the transition to the conceptual state. But in other cases, what best explains the evidence-insensitivity may not require that the perceptual state represent the same properties as the conceptual state. Even after you've learned that it's petrified wood, it can still sure look like wood – but this needn't of itself commit us to representations of woodhood in perception. The evidence-insensitivity may be based on what *is* represented in perception, together with how it is conceptualized (in some cases nearly automatically).[4] Linguistic meaning cases could be of this sort. Having heard an utterance of 'Where's the bathroom?', one nearly automatically conceptualizes it as someone asking where the bathroom is.

Now, utterance comprehension of course also exhibits pervasive evidence-*sensitivity* (see Allott, this issue). Why is it only in certain ways sensitive to evidence and background knowledge? An answer is that utterance comprehension comprises many sub-processes, only some of which are evidence-sensitive. The initiation of parsing and meaning-construction by appropriate linguistic cues seems insensitive to evidence that no meaning is expressed (as with 'More people have been to France than I have' or the inscriptions of ants). But it seems that processes triggered by a semantic feature's instruction – for example, a pronoun's instruction to find a referent – or geared to maximize relevance in the pragmatist's technical sense (balancing positive cognitive effect with processing costs) are sensitive to evidence, or at least to some evidence.[5]

[4]The conceptual state to the effect that it is wood could be mediated by a distinct, evidence-insensitive conceptual state to the effect that is brown, with such-and-such shape and texture, etc. (i.e. that it has the 'wood gestalt'). But see the remarks on basic conceptualization in Section 5.

[5]The question 'Why some evidence-sensitivity and some evidence-insensitivity?' arises just as much for proponents of semantic perception as for a view that adverts to post-perceptual conceptualization. Indeed, evidence-sensitivity, insofar as it's a cognitive top-down effect, is often raised as an objection to semantic perception (e.g., Stanley 2005). (I say 'cognitive top-down effect' to side-step debates about what should and shouldn't count as cognitive penetration – see Gross (2017b).) The presence of cognitive top-down effects is not in itself inconsistent with semantic perception, as Brogaard (2017, 2020) correctly points out; uncontroversial cases of perception are also subject to such effects. However, many of the top-down effects involved in utterance comprehension seem different in kind from those well-established in uncontroversial cases of perception, which are mainly attentional

2.2. Stroop

Brogaard (2017, 2020) suggests that Stroop interference supplies support for semantic perception. Subjects take longer and are less accurate in reporting the color a word is printed in if the word names a different color. This supports semantic perception, on Brogaard's view, insofar as the effect is due to fast, automatic comprehension processes capturing attention from the color-naming task. Speed and automaticity, as well as involvement in certain sorts of attentional effect, are characteristic of perceptual processes.

There is a question of just how automatic comprehension is – or, perhaps, of what sense of automaticity applies here. Various results suggest that spatial attention is necessary for Stroop interference, rather than words or word-meaning capturing attention early in visual processing (Labuschagne and Besner 2015 – on automaticity in language processing more generally, see Hartsuiker and Moors 2017). Moreover, at least in classic – color-*naming* – Stroop tasks, that there is interference even with words without color-related meanings provides reason to doubt a perceptual account. For instance, non-color-related words ('put') and pseudo-words ('hix') generate equal interference, more than phonologically unacceptable strings. This suggests that post-perceptual interference occurs at speech-code retrieval (the stage where the color is *named*), independent of comprehension (Kinoshita, De Wit, and Norris 2017).

That said, there are also *manual* Stroop tasks, which require a subject to indicate the color – typically from a task-set of four – via a button press rather than by naming the color. In such tasks, only color words generate Stroop interference. This, together with the fact that, in classic tasks, color-word Stroop interference is greater than non-color-word Stroop interference, may again suggest semantic perception. The picture is clouded, however, by the fact that color-*related* words – words for objects strongly associated with a particular color ('lemon') – do not generate Stroop interference on manual tasks, though they do on classic tasks (to a degree intermediate between color words and non-color-related- and pseudo-words), which again might suggest that comprehension is not automatic.

What then might we conclude? It is unclear – especially when the possibility of non-perceptual, non-inferential categorization is taken into account. Even the manual tasks could require such categorization:

effects. The possibility of post-perceptual conceptualization might open up as well the possibility of further kinds of top-down effect.

a transition from a perception as of a certain shade to a conceptual representation as of one of the four task colors.[6] It seems we can at least say that comprehension of task-related content can be sufficiently fast and automatic (given spatial attention) to interfere with color categorization. But we must leave it open whether the interference occurs perceptually or post-perceptually. The effect is thus neutral as to whether comprehension is perceptual.

One might object further that the Stroop consideration would at best support the perception of word-meaning, whereas Brogaard's claim is that *utterance understanding* is perceptual. But comprehension processes may be geared to retrieve assertoric content from subsentential utterances (Stainton 2007). The occurrence of 'red' may be nearly automatically understood, in context, as communicating that that is red. In any event, if the Stroop consideration fails to make the case even for perception of word-meaning, it fails as well for utterance understanding. Parallel remarks apply to most of Brogaard's other considerations.

2.3. Semantic priming

The presentation of a word can increase response times and accuracy on subsequent tasks that involve items related in meaning. Brogaard (2017) claims that the best explanation of this semantic priming – that the prime activates representational memory neurons, which in turn facilitates the processing of the target word – provides support for semantic perception. But it is not fully clear how it is supposed to do so. I offer three suggestions, raising doubts about each.

Brogaard develops her argument by adverting to the reinstatement theory of memory (Eichenbaum 2004; Serences et al. 2009; Rissman and Wagner 2012), according to which 'memory retrieval consists in a reinstatement of activity in the neural circuits that were initially involved in processing the external stimulus memory retrieval consists in' (Brogaard 2017). Not everyone accepts the reinstatement theory of memory (Xu 2017; Yu et al. under review). But, if it were correct, would it help support semantic perception? Perhaps if the theory required that *only* areas independently established to be perceptual were activated. But

[6]There is an on-going debate whether perceptual color attribution is categorical (Witzel 2019). The point in the text is neutral on this. Even if perceptual color attribution is categorical, the task might still require a transition from the perceptual attribution of a color category to a conceptual attribution (e.g. from a perceptual representation as of that's being red to a conceptual representation that it is red – where I'm taking license to use 'red' here, first, for a perceptual attributive, and then for a conceptual attributive).

this is not part of the theory, nor is it supported by the evidence. Indeed, the review Brogaard cites contrasts semantic cognition and perceptual experience in discussing studies of word meaning (Rissman and Wagner 2012, 106). If activation only of areas independently established to be perceptual is not required, semantic perception does not seem to follow. When a higher-level feature is retrieved, the reinstatement of neural activity that realized perceptual processes is consistent with the attribution of the higher-level feature having been post-perceptual. For example, the reactivation could be of areas implicated in the attribution of the lower-level features that provided cues for the higher-level attribution. This – along with associations among semantic representations – can explain semantic priming without requiring that the higher-level feature was itself perceived.

It may be suggested that, in other cases of priming (of color, shape, etc.), priming – which is fast and automatic – is a perceptual phenomenon, and this provides reason to think that semantic attributions, given their role in semantic priming, should be classed as perceptual too. But, first, there is evidence of cognitive (i.e. non-perceptual) priming, for example of syntactic structures by mathematical problem solving (Scheepers et al. 2011). And, second, there is evidence that semantic priming is not automatic at least in the sense of being task-independent (Kinoshita and Norris 2012).

Finally, it may be thought that, since inference plays no role in the best explanation of semantic priming, the semantic attributions involved in semantic priming should be deemed perceptual. But we have already rejected the framing that would license drawing this conclusion.

In sum, though evidence insensitivity, the Stroop effect, and semantic priming suggest ways that utterance comprehension is similar to perceptual processes, these considerations do not provide strong grounds to think utterance comprehension *is* perceptual. Non-perceptual – indeed, non-perceptual, non-inferential – processes, of a sort plausibly involved in utterance comprehension, exhibit these features as well.

3. Marks of perception

The phenomena discussed so far are not for the most part put forward in the perception science literature as compelling marks of the perceptual. (Evidence insensitivity is an exception, but more as a heuristic than as a focus of experimental investigation.) The phenomena discussed in this section – susceptibility to pop-out and to adaptation – most definitely

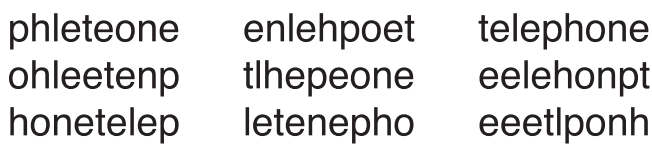

Figure 1. Experimental case. The word 'telephone' pops out in an array of words and pseudowords. This test indicates that grasping meanings or at least meaningfulness is a sensory phenomenon.[7]

are. Brogaard argues that linguistic meaning exhibits both. If she is right, this would provide very strong reason to accept semantic perception – or it would force a major reconceptualization of the perceptual. I will suggest that the case has not yet been made. (The possibility of non-inferentially-based conceptual states, emphasized in the last section, will again play a role in our discussion.)

3.1. Pop-out

Brogaard (2017, 2020) claims that, as measured by response time in a visual search, meaningful words 'pop-out' against a field of distractors formed by scrambling the target's letters. (Forming the distractors by scrambling preserves various lower-level features such as letter-frequency and string-length.) See Figure 1, which also reproduces Brogaard's caption.

Pop-out, she says, is also found, but greatly reduced, for words that 'may appear to be meaningful ('phonetele')' against a similar field of distractors. See Figure 2.

But non-words that lack the 'may appear to be meaningful' feature do not pop-out in an array of other non-words. See Figure 3.

Pop-out is widely accepted as a compelling mark of perception (Treisman 1985). If words pop-out in virtue of their meaning, that would supply very strong grounds for semantic perception.

A first question one can ask is whether the pop-out effect is due to a lower-level feature. Brogaard mentions meaningfulness, which we commented on above. But there is also phonological and orthographic acceptability, lexicality, and the possession of lower-level semantic features. It may be that the array in Figure 2 provides a control for

[7]Renumbered figures and captions reproduced from Brogaard (2020). Brogaard calls the distractors 'pseudowords'. 'Non-words' might be a better label because 'pseudoword' is often used for meaningless but phonologically acceptable (pronounceable) strings. Many of Brogaard's non-words are not pseudowords in this sense. Orthographic constraints are violated as well.

Figure 2. First control case. The word 'phonetele' hidden in an array of meaningless pseudowords yields only a weak pop-out effect.

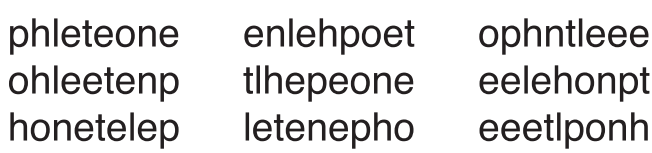

Figure 3. Second control case. When the array consists of pseudowords and no meaningful or quasi-meaningful words, there is no pop-out effect.

phonological and orthographic acceptability, though it is unclear, especially if such features are graded. But neither lexicality – being in the subject's lexicon – nor possession of lower-level semantic features are controlled for (however, when we turn to adaptation, we will see some reason to question whether lexicality is perceived).

But, second, one can question whether this is a pop-out effect at all. The standard mark of pop-out is that search time is not affected, or not affected much, by the addition of distractors: the slope of response time plotted against number of distractors is fairly flat. This is what suggests that the search was not serial, but rather that information processed in parallel led to the target's grabbing attention early in visual processing – or, more neutrally, that the search was particularly efficient (Wolfe 2018). Brogaard does not provide an indication that the effect of distractor number – and thus pop-out – was investigated. Moreover, previous related work – on letterhood, lexicality, valenced meaning, etc. – failed to find pop-out (Flowers and Lohr 1985; Soraci et al. 1992; Harris, Pashler, and Coburn 2004 – and see Wolfe 2018, 17, for a list of papers failing to find effects for learned categories more generally). Finally, because reading is an incremental, serial process, it is antecedently implausible that a 3×3 array of (non-)words each nine-letters long can be read in parallel sufficiently to yield semantic content.

It may be replied that, regardless of whether the feature pops-out, the difference in response times across tasks provides evidence of a perceptual phenomenon – more specifically, evidence of semantic perception if lower-level features aren't driving the results. But this would be mistaken

– or at least it is not assumed by perception scientists employing visual search. This is because response time differentials can arise from factors involved in post-perceptual categorization. 'Telephone' – as an already existing, overlearned (and phonologically and orthographically acceptable) lexical entry – is an easier target to remember and match than a novel scramble of those letters. Compare Treisman and Souther's rejection of search asymmetry (in the absence of pop-out) as evidence of a perceptual phenomenon. Search asymmetry is when a stimulus of type A is found faster among stimuli of type B than a stimulus of type B is found among stimuli of type A. So, there would be search asymmetry in variants of Brogaard's tasks if a word were found faster among non-words than a non-word among words, or vice versa. Treisman and Souther suggest that such a result would not reflect a perceptual phenomenon but rather 'the speed at which distractors can be serially checked to determine if they meet the target specification' (1985, 292).

3.2. Adaptation

Adaptation involves repeated or extended exposure to one kind of stimulus having an effect on the perception of later stimuli. Other phenomena have this character too – for example, priming. But adaptation is distinguished by various typical features: its temporal profile, the presence of repulsive aftereffects, its being retino- or spatiotopic, etc. Adaptation is considered to provide particularly strong evidence of perception. Webster (2015, 547) goes so far as to suggest that it may be necessary and sufficient – though cf. Webster (2015, 550) and Block (forthcoming).

Is utterance comprehension susceptible to adaptation? Brogaard (2020) suggests that semantic satiation is an adaptation effect – see also Nes (2016). Semantic satiation is the familiar experience of repetition seeming to drain words of their meaning. In experimental settings, it is studied via effects such as slowed response times in various tasks that are thought to tap into the same phenomenon.

A good example is Tian and Huber (2010). They ask whether semantic satiation involves lexical satiation (satiation of the orthographic representation), meaning satiation (where the meaning is satiated no matter how accessed), or associative satiation (satiation of the association between the orthographic representation and meaning). In three experiments, subjects performed speeded matching tasks involving labels for categories (FRUIT) and labels for sub-categories of those categories (APPLE). In Experiment 1, subjects were presented 20 trials in which

they saw a category label followed by a sub-category label and then judged whether the sub-category fell under the category. One category label was repeated in 10 trials randomly spaced among the 20. In Experiment 2, they were presented 20 trials of sub-category labels followed by distinct sub-category labels and judged whether they fell into the same category. The first labels shown in 10 of the 20 trials were for sub-categories that all fell under the same category. In Experiment 3, the task was simply to judge whether the first and second label were identical. Again, the same word was used as the first label in 10 of the 20 trials. Lexical satiation predicts slower responses for Experiments 1 and 3. Meaning satiation predicts slower responses for Experiments 1 and 2. Association satiation predicts slower responses only for Experiment 1, which is what they found.

If semantic satiation is a kind of adaptation, this would provide powerful support for perception of the features driving the slower response times.[8] If those features were lexical (or lower), this would not support semantic perception, even assuming satiation is a kind of adaptation. It is thus significant that Tian & Huber's results did not support lexical satiation. However, the current status of adaptation to words is cloudy. Hanif, Perler, and Barton (2013) provide evidence that adaptation to whole-word orthographic representations does occur.[9] And perhaps there is room to raise questions concerning Tian & Huber's experimental design. For example, adaptation to lower-level features can take longer than adaptation to higher-level features (Suzuki 2005), but Tian & Huber used the same number of trials in Experiment 3 – the experiment crucial for testing lexical satiation – as they did for the others; moreover, subjects took significantly less time to complete this task, so that stimuli were present for shorter durations. On the other hand, other studies (Samuel

[8]To be clear, Tian & Huber do not themselves claim that their results support a perceptual view of utterance comprehension. Indeed, they explicitly refer to semantic satiation as a non-perceptual process (Tian and Huber 2010, 271).

[9]There is also evidence of neural adaptation in the visual word form area. But the relation of this phenomenon to behavioral adaptation remains unclear (Larsson and Smith 2011). Two further notes: First, for ease of exposition, in the text, I do not pause to distinguish visual word forms, auditory word forms, and lexemes, though these distinctions and others are important for a fuller discussion of what's exhibiting adaptation. (Lexemes are representations stored in long-term memory that link simple word forms with other linguistic features. Complex words (*Pat's*) are constructed from them.) Second, on terminology: The term 'adaptation' is used in the psycholinguistics literature for a different phenomenon: adjusting one's speech and comprehension strategies to bring them into conformity with others'. This is closer to priming and the opposite of a repulsive effect. It's been argued that syntactic adaptation, in this sense, explains a kind of satiation (Lu, Lassiter, and Degen 2021). But 'satiation' is also being used in a different sense here! This kind of satiation is when a string is judged less unacceptable after repeated exposure.

1997 – and see Yuan et al. 2017 for Chinese characters) also failed to find adaptation to lexicality.

But, either way, the proponent of semantic perception runs into problems. If lexicality does adapt, then the satiation can be accounted for by adaptation of lower-level features. But if lexicality does not adapt, the claim that semantic satiation is a kind of adaptation faces a challenge. For, if semantic satiation is a kind of adaptation, we should *expect* lexicality to adapt. In general, if higher-level features adapt, so do the lower-level features on which they causally depend (Webster 2015). Indeed, it is because of this that establishing adaptation of higher-level features can be difficult: one must find a way of eliminating lower-level adaptation as an alternative explanation (cf. Block 2014; Burge 2014) – for example, by creating adaptation metamers or by demonstrating cross-modal transfer of high-level adaptation to a modality with different lower-level features.

To this second horn of the dilemma, one might reply that it's a mistake to think that semantic satiation involves adaptation of a higher-level *feature*. Indeed, the proponent of semantic perception might take this as the lesson of Tian & Huber's claim that semantic satiation is associative satiation, not meaning satiation: it's not meaning that adapts, but a meaning's association with a lexeme. But this reply falls prey to a further dilemma. Consider typical adaptation to a feature, such as being red. As mentioned, typical adaptation is retino- or spatiotopic; perception of the feature is not affected elsewhere. So, one might say it's not redness that adapts, but redness as related to a location (construed broadly). If satiation of meaning as specifically associated with a certain lexeme is deemed sufficiently analogous, then the point about lower-level features – or lower-level features relative to a 'location' – stands. That is the first horn of the further dilemma. But if the cases are relevantly different, that itself provides reason to think that semantic satiation is after all a different phenomenon from adaptation. Indeed, that semantic satiation is a different phenomenon is suggested as well by the apparent lack of repulsive aftereffects.[10] And, even if there is independent reason to group satiation with standard cases of adaptation, these differences within the class (cf. Block forthcoming, for more) could motivate treating satiation as a special kind of adaptation that is not obviously diagnostic of being perceptual. Perhaps, on such a view, satiation would be a kind of

[10]The lack of repulsive aftereffects could be owing to differences in the organization of semantic space in comparison with the quality spaces of lower-level features. But this difference might itself again suggest that the phenomena of adaptation and semantic satiation are different.

cognitive adaptation (cf. Helton 2016), and only more standard adaptation would provide a compelling mark of perceptuality.

In sum, we lack compelling evidence of either pop-out or adaptation of utterance content. This does not show that there are no such effects. But the burden is clearly on the proponent of semantic perception. The proponent could also try denying that such effects are necessary for perception; perhaps they are just sufficient, and maybe necessary, only for lower-level features. Indeed, perhaps a focus on comparisons with uncontroversial cases risks conflating marks of the subset comprising those uncontroversial cases for marks of perception more generally. But we have been evaluating what can be said for semantic perception if one does advert to uncontroversial marks of perception. If a proponent of semantic perception wants to abandon that strategy, some other argument for semantic perception is needed.

4. Marks of cognition

While utterance comprehension shares some features with uncontroversial cases of perception, we currently lack clear evidence that it is perceptual. But, further, it can be argued that there are features – indeed, fundamental features – that uncontroversial cases of perception share but that utterance comprehension lacks.

Burge (2010, 2018, 2020) and Block (forthcoming) maintain that perceptions are iconic, non-conceptual, and non-propositional. On their views, these features of perception are constitutive or at least explanatorily fundamental. They are tied to the function of perception – to represent the here-and-now in ethologically relevant ways – and help explain why such diagnostic features as susceptibility to pop-out and adaptation are prevalent in perception. But the states yielded by utterance comprehension are discursive, not iconic; and they are conceptual and propositional. I will remark on these features – treating conceptuality and propositionality together, as they are closely linked.[11]

[11]There is also Burge's (2010, 413) view that perceptual constancy mechanisms are sufficient and perhaps necessary for perception. But, as Burge notes, because the constancy mechanisms need to be *perceptual*, one cannot simply use the presence of constancy mechanisms to settle hard cases. In addition, Burge allows some features to be perceptually represented in virtue of being 'harnessed' to a process that involves perceptual constancy mechanisms for other features (cf. Gross 2017a). It's thus unclear whether consideration of constancy mechanisms would advance debates about semantic perception.

4.1. Conceptuality and propositionality

Conceptuality and propositionality are linked because a state is conceptual if it plays a role in reasoning, as premise or conclusion – and this requires as well propositional structure. (Burge, but not Block, would also endorse the neo-Fregean thesis that concepts are constituents of propositions.) Both Burge and Block allow that percepts have *structure*. For example, they constitutively (for Burge) or typically (for Block) have both demonstrative and attributive aspects. Moreover, complex perceptions have perceptions as parts (a perception of a square 'contains' perceptions of edges), and perceptions can represent relations among multiple entities (Hafri and Firestone 2021). But perceptions seem to lack *logical* structure. They thus don't participate in inference (but rather in non-inferential computational transitions) and lack conceptuality and propositionality.

One main source of evidence for this is that uncontroversial cases of perception lack content that is conjunctive, disjunctive, conditional, negative, or general (in the quantificational sense)[12] – apparent counterexamples (perception of absence, binding) to the contrary. I won't rehearse the case here, but will suppose it sufficiently plausible for it to be worth considering where that would leave utterance comprehension.[13]

The indirect speech attributions that are best candidates for perceptuality present an interesting case, because they combine propositionality and logical structure regarding the attributed utterance content with a lack of logical complexity in the attribution of that content. To illustrate: proponents of semantic perception maintain that subjects may have perceptions to the effect that John said that if that is red, we should wait, but they should agree that we do not have perceptions to the effect that, if

[12]It is a crucial part of Burge and Block's views that perception (non-conceptually) attributes properties. Such attributions are general in the sense that attributives can hold of multiple entities, and it is fundamental to their function that this is so – for example, in enabling the generation of expectations. But – the claim is – perceptual contents do not exhibit quantification. There is an issue here. This precludes accounts of perceptual content in terms of existential quantification: *there is green there*. Block (forthcoming), contra Burge (2010), is open to such perceptual contents. Perhaps, though, it suffices for the non-propositionality of perception that its logical complexity is greatly restricted. Cf. Burge (2010, p. 540).

[13]My intent here is to explore the question of semantic perception through the lens of Burge and Block's views, with which I am broadly sympathetic, not to argue for these views. As indicated, their views in some ways differ. Relevant to the above: Burge (2020) seems more open than Block to Bayesian computations in perception, but would not consider such transitions inferential since the probabilistic representations are not propositional. Block's (forthcoming) argument against Bayesian inference in perception centers more on a defense of instrumentalism regarding the Bayesian models. (See also Gross 2020.)

that is red, then John said that we should wait – though we can, for example, believe that that is the case. More generally, subjects can understand speakers to have expressed conjunctive, disjunctive, conditional, negative, or general content. But, at least so far as the best candidates for semantic perception are concerned, their comprehension does not involve states to the effect that: if P, then the speaker said that Q; or it was either asked whether P or asked whether Q; etc. Again, one may of course have beliefs with such content, but not perceptions.[14]

The logical structure of the attributed content already suffices to differentiate these attributions from those typical of uncontroversial perceptions, as does the metarepresentational character of the attribution. But we may ask why, if the attribution is *not* perceptual, there is this apparent absence of logical complexity at the level of attribution. If utterance comprehension is not perceptual, why *can't* it involve representations to the effect that, if that is red, then John said that we should wait? A partial answer is that it can, once we have crossed to the conceptual side: that is certainly something one can believe. But a further answer is that one can preserve a distinction among cases (those with and those without logical complexity outside the attributed speech content), even while grouping them all as non-perceptual, by distinguishing conceptual states based more-or-less directly on perceptual states (perhaps semantic seemings) from those that are not. The former may be limited in logical complexity precisely because they are more-or-less directly based on perceptual states that as such lack logical complexity.

4.2. Iconicity

It is a widely, but not universally (Pylyshyn 2002; Quilty-Dunn 2020), held view that the format of perceptions is iconic (picture-like), not discursive (language-like). How best to characterize iconicity is disputed. But, on either of the two main approaches, indirect speech attributions seem poor candidates for iconicity.

[14]I am assuming that utterance understanding involves more than in some sense entertaining the proposition expressed: there is a representation as well of force and an attribution to something (speaker, utterance, sentence-in-context). But if utterance understanding involves only entertaining the proposition expressed, then the propositionality point is even more obvious. A different strategy would be to drain the perceptual indirect speech attribution of propositionality and logical structure in neo-Davidsonian fashion (Nes, this issue). Perhaps the perceptual content is something like: <<$that_1$, $that_2$>, samesays>, where the first demonstrative refers to the utterance and the second to an appropriate mental representation. A problem is that the second demonstrative is not perceptual and so neither is the attribution of samesaying.

The first conception invokes some version of a Parts Principle – for example, that every part of a representation represents a part of what the whole representation represents (Kosslyn 1980; Fodor 2007; Carey 2009). The notion of part deployed here, as Fodor develops the idea, is not tied to any privileged decomposition, in contrast to the constituents picked out by a sentence's mode of combination. The systematicity and productivity displayed in utterance comprehension is among the main motivations for assigning sentences a privileged decomposition into constituents and would seem to motivate as well a non-iconic view of utterance comprehension itself.

The second conception, favored by Burge (2018) and Block (forthcoming), derives from Shepard's 'second-order isomorphism' proposal (Shepard and Chipman 1970; Shepard 1978). It has been developed in various ways, but the leading idea is that relations among the represented features correspond to relations (exploited in processing) among the representations. On a simple model, differences in degree of stimulus intensity might correspond to differences in rates of neural firing. But the myriad properties that can be represented in utterance comprehension do not stand in relations that correspond to relations among the representations themselves.[15] Moreover, as the idea is developed by Burge (2018), the correspondences must be 'natural'. However naturalness is best cashed out, it would presumably be a constraint that it not include arbitrary relations of the sort that obtain between words and mental representations and that mediate utterance comprehension. Likewise, Block's (forthcoming) development invokes correspondences among degrees of change in stimulus and representation that do not apply to the discrete representations deployed in utterance comprehension.

It's obvious that proponents of semantic perception would reject iconicity as a mark of the perceptual – perhaps the same might be said of non-conceptuality and non-propositionality. But this rejection will seem unmotivated to the extent that these features cluster with non-controversial cases of perception – all the more so if there's an account which explains why they do and why other accepted marks (such as susceptibility to pop-out and to adaptation) cluster as well and are explicable in the light of the function of perception.[16] A full story is beyond our

[15]Perhaps a neo-Fregean about indirect speech attributions may object that the matrix-representations represent *Sinne* that stand in inferential relations mirrored by the representations themselves. But there would remain the representational constituents outside the matrix.

[16]At least the rejection will seem unmotivated if the proponent of semantic perception wants to base her case on empirical arguments of the sort we've been examining. Other proponents might try rejecting the claim that perception is a natural kind or try arguing for a kind of pluralism according to which

scope (see Block forthcoming). But we can offer some brief indications. Perception functions to represent the here-and-now in ethologically relevant ways. It's often suggested that its susceptibility to adaptation results in part from a sensitivity to change and a preference for new information that reflects this function. Pop-out and other aspects of visual search are likewise part of a complex solution for quickly extracting accurate, relevant information from the here-and-now despite our many limitations. Perception's non-discursive format and non-conceptual, non-propositional content can also be tied to its function. Lande (under review – cf. Burge 2020) emphasizes how the composition of complex percepts – for example, how representations of contours are composed from representations of line-segments – reflect statistical regularities in nature, which enables the fast generation of reliably accurate representations of the here-and-now. In contrast, the format of conceptual representations is geared to allow the comparatively unconstrained representation of, and reasoning about, the past, future, and counterfactual – indeed, the improbable and impossible. The point is not that accuracy and relevance play no role in conception, but that its larger scope – untethered to the here-and-now – meshes better with a discursive format that does not bake statistical regularities into its mode of composition.[17]

In sum, utterance comprehension exhibits features that group it with the conceptual, not the perceptual. Moreover, this grouping is underwritten by functional considerations that illuminate why these features would cluster as they do.

5. Perception, conception, inference, and utterance understanding

Utterance comprehension lacks marks indicative of perception in uncontroversial cases and possesses marks indicative of non-perceptuality. But utterance comprehension is indeed in some ways perception-like: it is stimulus-driven, fast, nearly automatic, etc. We noted that

there are various notions of perception useful for different purposes (cf. Nes, Sundberg, and Watzl forthcoming).

[17]Nor is the claim that iconicity plays no role in post-perceptual cognition. Indeed, Burge (2020) maintains that all propositional beliefs immediately formed from perceptions are iconic. This is relevant in considering the possibility of iconic representation in perception with non-iconic elements (cf. Clarke forthcoming). There are certainly iconic representations with non-iconic elements – e.g. maps with a 'You are here'. Perhaps there are mental representations of this sort as well. But it wouldn't follow that there are perceptual representations of this sort. It could be that any non-iconic elements would be introduced post-perceptually. The arguments of this paper suggest that this would be so at least with meaning attributions.

conceptualizations of perceptions can exhibit these features too. Debates about the admissible contents of perception more generally need always to bear this possibility in mind. But utterance comprehension is not just like the conceptualization of lower-level visual features like color. Utterance understanding is highly complex in idiosyncratic ways. Many important and interesting questions remain about its perceptual and non-perceptual aspects. For example, just what in the process of utterance comprehension *is* perceptual? What is involved in the transition from the perceptual to the conceptual in utterance comprehension? And where might inference come into the determination of utterance content? These topics are too large to treat here, but I conclude with some brief remarks spurred by our discussion so far.

Phonemes do adapt (Samuel 1997) and thus are perceived.[18] But, as we've seen, it's unclear whether there's lexical perception. If words are not perceived as such, then processes that use perceived phonemes to retrieve lexemes from long-term memory, and to construct complex lexical representations, are post-perceptual – though fast, automatic, etc. Moreover, on standard views, the processes that generate syntactic representations involve projections from features tied to words. So, if words are not perceived as such, then parsing is likewise not perceptual (though, again, fast, automatic, etc.), and syntactic structure is not perceived. Fodor (1983) characterizes the parser as an 'input analyzer'. But, even if parsing is modular (Ferreira and Nye 2017), it may be a post-perceptual input analyzer.

The possibility that words and syntax are not perceived enables us to raise in particularly clear form a question about the transition from the perceptual to the conceptual. Burge (2020) and Block (forthcoming) both emphasize 'basic' conceptual states that are directly based on perceptions. These states do not go beyond the content of the perceptual state. A perception with the demonstrative *cum* perceptual attributive content <that, red>, for example, may get conceptualized as the proposition <That is red>.[19] This could naturally suggest a picture in which the transition from the perceptual to the conceptual always involves

[18]Kazanina, Bowers, and Idsardi 2018 provide a general defense of phonemes' central role in speech perception. Phonemes do not exhaust what is perceived in typical utterance comprehension: there is stress, duration (which, like stress, provides cues to word boundaries), larger intonational contours, etc. There are also the various non-linguistic items and features – perceived features of utterance context – that can be relevant to utterance comprehension. Moreover, the phonemes may be perceived as ordered and grouped.

[19]For the sake of simplicity, I am ignoring the possible mediation of post-perceptual, but still non-conceptual states, such as perhaps those in working memory. Cf., e.g. Burge (2014).

basic conceptual states that in this sense all but match perceptual content. Conceptual representations that go beyond this content must then be computationally subsequent to the basic conceptual state. But the case of language may challenge this picture.

Suppose perception in auditory utterance comprehension ends with the perception of phonemes. From this perception, there are (non-inferential) transitions, involving retrieval of lexemes from long-term memory and the generation of syntactic structure, that lead to conceptual representations. But the content of these representations goes beyond that of the perception: the content is not restricted to phonemes. To retain the idea that the transition from perception to conception yields basic conceptual states that match the perceptual state in content, one must hold that the perception as of phonemes yields a conceptual representation as of those phonemes that in turn is the input to the retrieval and parsing processes. Such a proposal would not require that retrieval and parsing are inferential: though inferential processes are necessarily transitions among conceptual states for Block and Burge, transitions among conceptual states are not necessarily inferential. But, still, the proposal would be a significant empirical claim in need of support. Why couldn't the perceptual states themselves directly serve as input to these processes, *even if* matching conceptual states concerning phonemes were generated as well?

A parallel question can be raised even if the perceptual part of utterance comprehension goes beyond phonemes – for example, if it ends with words, but does not include syntax, and perhaps even if it includes syntax and some lower-level semantic features. Indeed, it can be asked generally whether transitions from perceptual states to first conceptual states can yield states with added, or different, content. For example, can a perception as of an organism with such-and-such features transit to a conception as of a cow without the mediation of a *con*ception as of an organism with such-and-such features, even if the perception does yield the latter conception as well? The question loses its force, however, once the transitions are inferential. Again, on Burge and Block's view, inferential transitions are always among conceptual states.

Where in utterance comprehension does inference come in? Of course, in principle, inference – for example, conscious, deliberate inference – can play a role in figuring out any feature of an utterance (and is more likely when comprehension is difficult). But what of typical unreflective, effortless understanding? We have already noted that utterance comprehension is sensitive to all sorts of background and contextual knowledge in

multifarious ways. But is this sensitivity inferential? That depends on what counts as inference, about which there are various disagreements both verbal and substantive (e.g. Boghossian 2014; Neta 2013; Quilty-Dunn and Mandelbaum 2018; Malmgren 2018; Buckner 2019). I limit myself here to Brogaard's (2020) perspective. She requires that an inference be consciously accessible. This precludes creatures without consciousness from engaging in inference, which may seem too strong (unless the restriction is stipulative). Depending on how the '-ible' in 'accessible' is cashed out, it may preclude young children as well. Be that as it may, it is unclear whether any aspect of typical unreflective, effortless utterance comprehension is inferential in this sense. To be sure, speakers can often articulate reasons in support of their understanding. But though the reason (and that it's a reason) may be consciously accessible, the transitions in the fast, automatic processes that are sensitive to the reason may not be. (*Post hoc* reconstruction is not bringing a transition to consciousness.) Thus, Brogaard (2017, 2020), defending semantic perception, denies that such evidence-sensitivity is inferential. Importantly, the defender of post-perceptual, non-inferential utterance comprehension can deny this as well, on this construal of inference. Whether evidence-sensitive transitions in utterance comprehension should count as inferential on other construals of inference depends both on the construal and the facts about the transitions. But inferential or not, we lack empirical grounds to consider them perceptual.

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