Conscious Perceptual Experience as Representational Self-Prompting

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The *self-prompting* theory of consciousness holds that conscious perceptual experience occurs when non-routine perceptual data prompt the activation of a plan in an executive control system that monitors perceptual input. On the other hand, routine, non-conscious perception merely provides data about the world, which indicatively describes the world correctly or incorrectly. Perceptual experience instead involves data that are about the perceiver, not the world. Their function is that of *imperatively prompting the perceiver herself* to do something (hence "self-prompting") via the monitoring activities of her executive control system. The theory explains both phenomenal consciousness and "what it is like" to be perceptually conscious of an item. In addition, as applied to early perceptual attention, the self-prompting theory can explain how and why consciousness evolved.

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There is now a widespread consensus in cognitive science that conscious perceptual experience is not the only kind of perception. There is substantial evidence that non-conscious perception can occur as well (for a summary see Merikle, Smilek, and Eastwood, 2001). In one prominent example, Milner and Goodale (1995) argue that there are two separate visual systems in the brain. They claim that the ventral system supports conscious perceptual experience, but the dorsal system instead supports only non-conscious perceptual processing (see also Jacob and Jeannerod, 2003). Recent work on attention shows that both conscious and non-conscious kinds of perceptual processing exist (Groh, Seidemann, and Newsome, 1996; Kanwisher, 2001; Itti, Rees, and Tsotsos, 2005). The phenomenon of blindsight in impaired perceivers demonstrates that perception can occur

in the absence of any conscious experience (Weiskrantz, 1998, 2002). In addition, evolutionary theory supports the view that perceptual experience of a phenomenally conscious kind is an evolutionarily late outgrowth of more basic, unconscious kinds of perceptual processes, which may also persist in advanced organisms (Carruthers, 2005; Edelman, Baars, and Seth, 2005).

But what distinguishes conscious from unconscious perceptual states or processes? As a preliminary, distinguish three kinds of consciousness. *Access consciousness* (Block, 1995) concerns the wide availability of information to other cognitive processes, such as when the content of a mental state is poised for the control of rational action, verbal report or reasoning. Baars (1988, 1996) and Dennett (1991) present theories primarily addressing access consciousness. *Phenomenal consciousness* concerns experiential contents, such as the phenomenal redness of a red patch (Block, 1995). Carruthers (2000) primarily addresses this kind of consciousness. Finally, *"what it is like" consciousness* concerns "what it is like," in a first-person rather than third-person way, to be a perceiver who is experiencing some content (Lormand 2004; Nagel, 1974; Rosenthal, 2005, who also defends a version of phenomenal consciousness). For simplicity, "what it is like" consciousness will be referred to as *likeness* consciousness, since it concerns *what it is like to be a perceiver*, rather than concern about the specific contents of the state.[1] The present article primarily addresses phenomenal and likeness conscious experiential states as they occur in perceptual cases, the only kinds of states to be discussed from now on (unless otherwise indicated).

The basic problem for any theory of conscious perceptual states is that of how to distinguish them from non-conscious states. One prominent group of theories adopts a *metacognitive* approach. On this approach, what makes a state conscious is that it is the object of some other cognitive state. For example, "inner sense" theories claim that a kind of introspective mental scanning, or inner perception, converts non-conscious into conscious states (Armstrong, 1968, 1981; Lycan, 1996). Higher-order thought theories instead claim that a state becomes conscious when it is the object of a higher-order thought about it (Carruthers, 2000; Rosenthal, 2005).

However, a relatively neglected non-metacognitive *monitoring* approach is also potentially available. The monitoring approach attempts to capitalize on different functional roles of perceptual data within a cognitive system. Non-conscious perception involves only routine data, unaffected by any monitoring. By contrast, conscious perception involves non-routine data that requires further processing by a *supervisory or executive control system* that monitors the data. On monitoring approaches, perceptual states become conscious when

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[1]Some writers alternatively distinguish creature consciousness, such as being awake rather than asleep, from state consciousness, e.g., Rosenthal, 1990. Both phenomenal and likeness consciousness would be forms of state consciousness, on this alternative mode of classification.

they trigger some further monitoring-related cognitive activity of an executive control system, over and above the processing of routine, non-conscious perceptual data (or on some accounts, e.g., Shallice, 1988, the activity of the executive system itself may become conscious under these conditions). But monitoring approaches as here defined are not metacognitive, because a monitoring executive module is just one more module within a complete cognitive system, rather than its being a thought or introspective cognitive state that is about another cognitive state.

I shall propose a monitoring theory of this non-metacognitive kind, to be called the *self-prompting* theory. It explains conscious perceptual states or experiences in terms of the relevant perceptual data prompting activation, via a monitoring process, of some plan or action schema in an executive control system. The full self-prompting theory also has three other components. The second component concerns the *intentionality* (aboutness or directedness) of perception. Non-conscious perception is directed upon the world, but conscious perceptual experience is directed upon *the perceiver herself*. Having a conscious perceptual experience is a matter of perceptual data prompting *oneself* to do something — hence the description of the theory as involving *self*-prompting. The third component concerns the semantic or representational status of each direction. World-directed perceptual states have an indicative or descriptive semantic status — they can be correct or incorrect about some worldly state. By contrast, I argue that self-directed states have an *imperative* status: their semantic function is to prompt the perceiver to do something, rather than to describe the perceiver. The second and third components may be combined in representational terms as follows. I claim that some perceptual data have a dual representational status. In non-conscious perception they descriptively represent the world, but in conscious perception they imperatively represent actions that the perceiver himself must perform.

The fourth and final component of the self-prompting theory involves a distinction of phenomenal consciousness from likeness consciousness as two different kinds or levels of perceptual content. Roughly speaking, the phenomenal contents of an experience are those contents that are invariant between different interpretations of the self-directed perceptual data. Likeness consciousness — what it is like to experience the phenomenal content — is identified with each different experience taken as a whole, as distinct from its phenomenal content. As for issues of originality, to the best of my knowledge the overall connections, and particular details, of all four components of the self-prompting theory are novel.

Here is some further introduction to the representational self-prompting approach to conscious perceptual experience. Consider a motorist approaching a red traffic light. He non-consciously perceives that the light is red. The relevant red-related perceptual data have no inherent meaning. But the driver

has learned to associate a *representational, imperative meaning* with red traffic light data, namely that *he must stop* when he perceptually acquires those data. My claim is that the conscious perceptual experience of the red light is constituted by the specific functional role of the red-related data in representationally prompting the driver himself to stop. Also, non-conscious perception involves acquisition of data about *the world*, but self-prompting cases re-purpose some of that data as data about *the perceiver*. In representational terms, non-conscious perception represents the world descriptively, while perceptual experience instead imperatively represents something about the perceiver himself, namely that he must plan to perform some specific action.

The broader structure or cognitive architecture associated with experiential self-prompting is as follows. Non-conscious perception can be explained in functional terms involving inputs, internal processing, and behavioral outputs (Dilworth, 2004, 2005a, 2005b, 2006b). Some automatic or routine plans may be prompted by non-conscious perception, independently of any monitoring by executive control processes. But a complete cognitive system must also have functions for supervisory or executive control — generically describable as involving the *execution of plans* — including specific functions for decision-making and action coordination (Miller, Galanter, and Pribram, 1960; Norman and Shallice, 1986; Shiffrin and Schneider, 1977). Sampling or *monitoring* of the non-conscious perceptual data is needed, to check on potential relevance to current plans. Not all monitored data become conscious, because only some of them are relevant to current plans. Nor does relevance to a current plan alone guarantee a conscious status, because routine evidence of conformity to an ongoing plan does not require any plan-related action. It is only when monitored perceptual data *require some immediate activation of a plan* that the data acquire a representational self-prompting functional role as a conscious perceptual experience. For example, the monitoring of red traffic light data immediately prompts an interruption in the perceiver's current driving plan, causing it to be temporarily superseded with a stopping plan instead.

On this account of perceptual experience, it is constituted neither by perception alone, nor by routine monitoring of perceptual data. Perceptual experience occurs only when monitored perceptual data acquire the functional role of causally triggering or prompting activation of some plan *via the monitoring process*. Also, this self-prompting role of relevant perceptual data involves a purely representational content, because the datum itself (whether color data, shape data etc.) has no intrinsic imperative meaning. Its causal role in prompting or not prompting a plan activation entirely depends on how it is interpreted by a perceiver's internal monitoring process. In this respect perceptual experience is, if not a subjective matter, at least an idiosyncratic one. It depends on the specific details of an individual perceiver's plans and purposes, as well as on her particular cognitive endowment and behavioral history.

Hence the resulting experience is not only *phenomenally* conscious because of the monitored plan-activation, but also *likeness* conscious because of the person's own idiosyncratic kind of plan-activation — which defines what it is like for him to experience the relevant phenomenal content. By contrast, on the present view any perception which is independent of the monitoring process provides descriptive, impersonal data about worldly objects and properties, which is not conscious in either phenomenal or likeness ways.

Plans and Monitored Plan Activation

The concept of a plan, and of monitored plan activation, introduced in the above exposition of the self-prompting theory will now be explained in more detail. On the present account, a plan is a causal mechanism or group of mechanisms, activation of which initiates some causal process that typically is describable in terms of its likely result, such as a plan to eat food (for a comprehensive selection of articles on plans and planning see Morris and Ward, 2005). In the current generic sense, a plan includes whatever mechanisms are required to execute it (for skepticism about whether planning and execution could be separated in any case, see Cisek, 2005). Plans may be introspectively accessible via high-level intentional linguistic structures, such as a person's plan to buy a car, or they may exist only as low-level causal mechanisms, accessible only via scientific investigation. Simple motor plans, such as a plan to pick up a nearby object, are partly high-level and partly low-level. A plan may or may not be associated with an executive monitoring process (for an overview of conscious, executively controlled plans see Haggard, 2005).

As an extreme example of a low-level plan, perceptual attention to the features of some object X may prompt activation of a low-level plan to store information about those features of X in long-term memory. But even in such a low-level case, monitored executive control may be involved (even pigeons possess a low-level form of executive control over long-term memory storage: Rose and Colombo, 2005). Some plans may be unsuccessful (never achieving their specific goal) or inchoate (having no identifiable goal even after scientific investigation of the mechanism). Hence my conception of a plan is significantly broader than Bridgeman's (1992) account of a plan as "an internally held image of an intended achievement" and "a scheme that can control a sequence of actions to achieve a goal," following Miller, Galanter, and Pribram (1960). This breadth of definition is necessary because there is no guarantee that all conscious perceptual experiences prompt activation of well-defined, potentially successful plans. As for the concept of plan activation, presumably no plan could be activated unless the resources to initiate it already existed in the cognitive system, so the concept of activating a pre-existing plan, rather than that of creating a completely new plan, is an appropriate one. Also, many

plans are hypothetical or contingency plans — a plan to do X if contingency C occurs — so it is natural to regard the monitoring of perceptual data concerning contingency C as being what prompts activation of a plan to do X.

A plan may have some internal structure, such as a *conditional plan* that has an internal conditional or if–then structure (Newell and Simon, 1972). For example, when one checks to see how much money one has on a bank statement, the perceptual experience of the printed amount typically would prompt activation of such a conditional plan. If the amount is about what you expected, deactivate the plan. If the amount is larger, think about how to spend the extra amount. If the amount is smaller, consider calling the bank to verify its accuracy. And so on. Some more complex plans may have a *hierarchical* structure, with stages and a sub-plan for each stage (Morris and Ward, 2005, ch. 5). Expert users of such a plan could treat the whole complex plan as a single unit, requiring only an initial perceptual experience to activate the whole plan. On the other hand, novice users may have to pay constant conscious attention to every detail of the plan, because for them, each subplan is a distinct plan requiring independent conscious activation. For example, expert drivers can travel many miles with almost no conscious experience of their driving, because all of the details of a driving plan have become routine for them. But those learning to drive must pay attention to every detail in order to survive on the highway. According to the self-prompting theory, this happens because of the multiplicity of distinct sub-plans, each of which must be activated separately, via a monitoring process, by the novice.

To sum up this section, plans are only relevant to conscious perceptual experience in cases when their activation occurs *via an executive control monitoring process*. It cannot be assumed that all planning is monitoring-related, for perception may directly prompt activation of routine plans in some cases, whether or not monitoring of the relevant perceptions also occurs. Presumably perceptually prompted activation of simple plans to eat food or flee from predators could occur even in creatures completely devoid of any high-level perceptual monitoring abilities. Also, some plan activation may be prompted by high-level cognitive activities, independently of perception. Hence the current explanation of conscious perceptual experience in terms of *monitoring-related* perceptually prompted plan activation must not be confused with other kinds of plan activation unrelated to monitoring.[2]

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[2]In this and other respects the self-prompting account is much more specific than that of Bridgeman (1992), who generically associates consciousness with any plan-related activities, and who employs no concept of monitoring-based perceptual prompting of plan activation — see also his discussions with other participants on the *Psycholoquy* website. In particular, as Baars and McGovern (1992) point out, Bridgeman defines the concept of a plan in several different ways, and provides no psychological functions for conscious experience itself, so that such experience has a purely epiphenomenal status on his account.

The Comprehensive Scope of Self-Prompting

The self-prompting approach to perceptual experience assigns a very specific functional role to the contents of such experiences in two related ways. The content is imperative rather than indicative. And it imperatively requires some specific, plan-activating processing to occur via an executive monitoring process. But critics might question whether this account has the requisite generality to explain the contents of typical perceptual experiences. One problem is that when we look at things, the contents of our visual experience don't *seem* to be imperative in most cases. Perhaps they are in a few traffic light kinds of situations, but most of what we see does not have any socially assigned imperative function. How could self-prompting explain these more typical cases?

The instruments or indicators found in vehicles such as cars and airplanes provide a useful intermediate case. Their functions typically include both imperative and indicative elements. For example, the fuel gauge on a car provides indicative information about the amount of fuel that is left, but it also serves as an imperative warning to the driver as the needle approaches the "empty" position. Indicators such as warning lights primarily function to warn drivers of actions that must be taken, such as replacing oil or a headlight, but they also provide information about the relevant state of the vehicle. The self-prompting approach can analyze such mixed indicative/imperative cases as follows. The indicative information provided by instruments or indicators is processed by basic, non-conscious perception, while their imperative functions are explained by conscious self-prompting.

But this still leaves it unexplained how a driver could potentially be conscious of *any* of the possible positions of the needle on a fuel gauge, and not just the near-empty positions that normally prompt immediate action. At this juncture the relativity of self-prompting to the specific plans of the perceiver becomes clear. If the driver is planning to go on a long trip that requires a full tank of fuel, then any position of the needle other than full would require him to change his plans to include a stop at a filling station. Other plans, such as a plan to drop off a rental vehicle with as little fuel as possible, so as to economize on fuel costs, would instead prompt plan-changing actions if the tank is relatively full. Hence the following reply to the objection may be given. It is true that anyone can potentially perceptually experience the content of any position of the needle with respect to *some* possible plan that they might have. But this does not imply that a perceiver would actually experience the content of some *specific* needle position at a particular time, in the absence of a relevant plan with respect to that needle position. For example, casual or routine perceptual scanning of the instruments in the car would not provide any conscious experience of the fuel needle position, if the position indicates that no fuel-related plan needs to be activated.

To be sure, a person might deliberately decide to check the fuel gauge in her car, and experience as a result whatever specific fuel level is indicated by the position of the needle. Arguably the functional role of that experience of the needle position is that of prompting activation of a *fuel conditional* plan, which is specifiable as a structured plan involving a list of if–then conditions. For example, if the tank is full, then deactivate the plan; if the tank is empty, refuel soon; and so on for intermediate cases. Typically such a deliberate decision to check the fuel level is caused by some extraneous perceptual factor, such as seeing a filling station in the distance as one is driving. In such a case, the specific level of fuel perceptually experienced, whatever it is, would prompt some particular plan-related and station-related decision, such as either to stop and refuel at the station, or not to stop since refueling is unnecessary. In either case the non-conscious perception of the position of the fuel gauge needle is promoted to a conscious experiential status in virtue of its prompting activation, via a monitoring process, of some relevant, station-indexed and fuel-related plan — including dropping the plan altogether if the fuel level reading makes it unnecessary.

Such relatively low-level functional processes also serve to explain why the contents of our visual experience do not *seem* to have an imperative role in many cases. We intuitively associate imperative roles only with high-level, deliberate contents, such as the contents of orders issued by military commanders to their subordinates. But perceptual self-prompting roles would often not be introspectively available in this manner, and hence would be invisible to most perceivers. The fact that many conscious elements in perception do not seem to have an imperative function is consistent with their being associated with one nevertheless.

Also, a potential misunderstanding must be guarded against. The self-prompting theory does not claim that conscious experiences *as such* imperatively cause plan-activations. If that were the claim, then the conscious status of the experiences would have to be explained in some manner independent of the caused plan-activations. Instead, the theory claims that imperative activations by perceptual data are what *constitute* conscious experience. Hence any intuitions about imperative prompting based on incorrect understandings of the theory must be discarded. The legitimate claim is only that whenever we are perceptually conscious of something, the perceptual data associated with that experience has imperatively prompted, via a monitoring process, a plan-activation.[3]

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[3]It is sometimes simpler to write as if conscious experiences cause things, or have a functional role, but such descriptions should always be understood as claims about the causal powers or functional role of the relevant perceptual data.

Consciousness-Related Prompting of Perceptual Processes

There is still one major role for experiential perceptual self-prompting that has not yet been discussed. It concerns a special class of perceptually prompted plans, namely plans concerning *further perception* of whatever caused the initial perceptual data that produced the initial perceptual experience. Perceptual studies of attention show that early perception of a scene typically involves an initial fast parallel scanning of the scene, followed by more intensive serial perceptual processing of a selected area (Itti, Rees, and Tsotsos, 2005; Kanwisher, 2001).

What is the functional role of perceptual experience within this overall selective attentional process? I claim that the conscious experience of one or more distinguished elements in an initial viewing of a scene — often called "pop-out" — has the functional role of *prompting more intensive perception* of that same area that is experientially salient or distinguished (cf: Neisser, 1976, p. 23: "the function of an unexpected stimulus is to initiate the cycle of perception proper"). In this way the subjective experience of the scene, as containing an element that exhibits conscious saliency or pop-out, can be made consistent with the full range of scientific data on attention. This account also preserves the causal efficacy of perceptual experience, in that on this self-prompting account, the observed additional processing of an area is explained by the activated perceptual processing plan prompted by the data involved in the salient experience (for related discussions of pop-out see Chelazzi, 1999; Adler and Orprecio, 2006).

To be more precise, the salience of an element in a scene must be distinguished from the conscious experience of it as popping-out. The salience of an element is typically a property of statistical deviance, such as being a moving element among non-moving elements, or having a different color than other elements. An efficient visual system must have executive mechanisms for identifying such salient elements via a monitoring process. It must also include a plan, prompted by such an identified salient element, to initiate further perceptual processing of the relevant visual area. On the self-prompting theory, the experience of pop-out of that element is constituted by the causal process in which the salient element causally prompts activation of the further-perceptual-processing plan. This account also has the virtue of distinguishing attention-related processes from the process that constitutes experiential pop-out. The initial monitoring process — which results in identification of a salient element — is a process that narrows down attention to a single element, but that process is not itself conscious. It is only the next causal stage — the prompting by that element of the further-processing plan — that constitutes the conscious experience.

If this self-prompting account is correct, it is important, in that it significantly extends the range of the theory to include miscellaneous random perceptual

experiences of salient pop-out that need not involve any deliberate intentions or purposes. Such cases may be the hardest cases for any functional theory of visual experience or qualia, in that random visual experiences seem almost by definition to lack any functional role. But if they are genuine experiences at all, they must include one or more consciously distinguished areas or qualities, a main functional role of which can now be identified as that of prompting further perception of the causes of the relevant perceptual data items. Hence, even though experiential self-prompting is not itself a basic, non-conscious perceptual process, it is closely bound up with the causation of functionally vital additional non-conscious processes. The unconscious processes might include saccadic eye movements, which would move a noticed element in the periphery of the visual field to full foveal attention. Or additional, more intensive processing of an already foveated item might be involved.

If correct, this kind of attentional self-prompting is also significant in that it identifies a functional role for experience in attentional processes that a very wide range of animal species could qualify as possessing. Most animal species probably only have very rudimentary perceptual monitoring abilities, so that the kinds of sophisticated plans involved in much human experiential monitoring is unavailable to them (Seth, Baars, and Edelman, 2005). But basic attentional processes are required in almost any kind of successful perception, and they must involve at least some basic monitoring processes, in order for a visual system to filter out unwanted data and concentrate on items requiring further perceptual processing. Hence if the attentional self-prompting view is correct, nascent kinds of visual experience must be widespread among animal species. As for how such experiences developed, an evolutionary explanation could be given. Evolutionary factors would tend to favor species for whose members statistically deviant perceptual data in the visual field prompted further saccadic eye movements as needed, plus additional perceptual collection of data relevant to those same visual field regions. Species lacking such mechanisms would tend to die out.[4]

World-directed Versus Self-directed Intentionality and the Indicative/Imperative Distinction

The imperative functional role of perceptual data associated with monitored self-prompting cases will now briefly be further explained. The distinction of indicative from imperative content is a high-level semantic distinction

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[4]Hence the self-prompting theory can provide an argument for the adaptive benefits of conscious experience that is much simpler and more basic than the complexity argument of Nichols and Grantham (2000).

that depends on the broader functional role of perceptual data of each kind within the total economy of a cognitive system. Non-conscious perceptual data items have an indicative, or purely descriptive, semantic content insofar as uses made of those data by the cognitive system can be assessed for truth or correctness with respect to the worldly objects and properties that the data purport to describe. In terms of intentionality, insofar as the data are world-directed — i.e., they *refer* to the world, or are *about* the world — the data either truly or falsely describe some part of the world.

However, in the case of conscious experiences, my claim is that the functional role of data associated with them does *not* involve any world-related intentionality, and hence it does not have an indicative or descriptive role. When a red traffic light prompts a perceiver of it to stop, the only relevant semantic functional role of the red-related data is to *prompt the perceiver himself to stop*. Hence the correct semantic category in which to place that data is that of their having *imperative* rather than indicative content. In terms of intentionality, the data are self-directed rather than world-directed. Also, the data do not correctly or incorrectly describe the person to whom they are directed, but instead the data imperatively prompt him to do something (for background see Searle, 1969, who distinguishes indicative from imperative and other non-indicative speech acts).

Nevertheless, the above distinctions — of world-directed versus self-directed, and indicative versus imperative — are consistent with a single perceptual datum having both kinds of functional role. For example, the red-related perceptual data associated with perception of a red traffic light could both have an indicative, world-directed functional role as providing a correct description of the world, and also have an imperative, self-directed role in prompting the perceiver to stop. But the important point is that these are distinct functional roles for the data. My claim is that an adequate theory of conscious perceptual experience must sharply distinguish the roles, and explain the conscious experience itself purely in terms of the imperative self-prompting role of the data.

How Perceptual Data can be Consciously Meaningful

How could perceptual data become consciously meaningful on the self-prompting view? The question is relevant, because on some low-level conceptions of perceptual data, the relevant contents in some levels of analysis would be too impoverished to support any higher-level kinds of meaning, whether conscious or non-conscious (as with the subpersonal stages of Marr's [1982] computational theory of vision). This would be problematic because, on the self-prompting view, it is only the perceptual data themselves that become conscious, rather than any monitoring-related items such as the plans that are activated by the data.

Fortunately, however, there is no need for the self-prompting theory to claim that perceptual data are restricted to low-level kinds only. As with any functional role theory, the meaningful content of a relevant perceptual state is regarded as being defined by its causal role in a cognitive system. In the case of the self-prompting theory, the causal role of the data is defined by the data's place in prompting activation of some monitoring-related plan. Which specific kind of plan gets activated would determine the level and kind of content of the perceptual data. For example, the difference between hearing a meaningless succession of sounds, and hearing those same sounds as a familiar piece of music, would be as follows. Hearing the sounds just as meaningless would prompt only a low-level plan, such as a plan to perceive the same sounds in greater detail. Hearing the sounds as meaningful music would instead prompt some high-level, musically related plan, such as a plan to summon up some remembered imagery of what other sections of that same piece of music sound like. A similar distinction could explain the difference between hearing meaningless sounds in a language one does not understand, versus hearing the full meaningful content of a sentence in a language one does understand. Hence the full range of meaningful perceptual experiences falls within the scope of the self-prompting theory.

This result is significant, because any theory of consciousness which failed to explain meaningful perceptual content (e.g., Baars, 1988; Dennett, 1991; Hameroff and Penrose, 1996) would simply fail to address one or more of the hard problems associated with consciousness, such as that of explaining what it is like to consciously experience qualia which also have representational properties. Also, there is an important technical benefit of this kind of content-based explanation of conscious qualia (e.g., Lycan, 1996; Tye, 2000). Such theories can avoid postulating irreducibly non-physical conscious particulars, since references to qualia can be explained in purely representational terms — which the self-prompting theory in turn reductively explains in terms of the self-prompting functional role of such contents.

How Likeness Consciousness and Phenomenal Consciousness are Related

The issue of how likeness consciousness relates to phenomenal consciousness can now be explained more explicitly. The key to understanding their relations is implicit in the previous section's brief discussion of conscious meaningful data. There are different ways of interpreting any perceptual data that one receives. In the case of sounds, one might hear them just as raw sounds, or as musically structured elements in a musical composition. What needs to be added to the previous analysis is that there is a legitimate sense in which *the same* sounds are heard by the listener in each case, even though the interpretations are different. One sound is interpreted as being musically

meaningful whereas the other is not, but in some sense the same sounds are heard in each case (as distinguished from the same physical vibrations in the air that cause each differing perceptual interpretation). Or in a visual case, distinguish a consciously seen group of colored shapes on the surface of a painting from those same shapes interpreted as a certain subject matter, such as persons on a beach. In each case one can identify the same phenomenal qualities — colors and shapes — in the same areas of the canvas, but in each case the interpretations of them are different.

My hypothesis is that the phenomenally conscious elements of perceptual experiences of the picture are the *invariant contents* of each experience. Each different experience as a whole is the likeness consciousness. On this hypothesis, each different interpretation of a common phenomenal content is a different way it is like to experience that same phenomenal content. Or, to use a pictorial analogy, if several different painters paint the same subject matter, each in their own unique style, then the invariant subject matter is analogous to the phenomenally conscious content of an experience. The differing styles of painting provide an analogy to different ways it is like for each artist to experience that same content or subject matter.

A related way to describe this distinction of phenomenal from likeness consciousness is as follows. When red light strikes a person's retina, some red-related perceptual data are processed. The data continue to be red-related data no matter how the cognitive system processes them, as long as the cognitive process is veridical or correct. With respect to consciousness, the functional role of the red-related data changes depending on which plan the data activate in the supervisory system. But the instance remains red-related data nevertheless, which the cognitive system can identify as a common element in various different monitored top–down interpretations of the same data. In particular, there are more or less "pure" interpretations of the data that make the data conscious in a way involving only a minimum of interpretation. For example, as discussed previously, in early perceptual processing some monitoring of the data might result in nothing more than further perception of the same area of the visual field. This processing would make the red data conscious as a phenomenal red quality in a way that involves only a minimum of interpretation. This would provide a reference case of experience of the phenomenal redness itself, which would facilitate identification of the common phenomenal red-related element in any different, likeness-related interpretations of the data.

This account can be strengthened by also considering secondary or derivative cases. For example, what it is like to experience great music also includes its emotional and physiological effects upon oneself. In such a case, the meaningful musical sounds also prompt, or are accompanied by, related bodily (proprioceptive) perceptual experiences, which have their own characteristic combinations of phenomenal and likeness consciousness. The full richness of

what it is like to enjoy great music, or many other paradigm experiences, also includes such secondary conscious effects.

Are All Conscious Experiences Perceptual?

How does conscious perceptual experience relate to other kinds of conscious experience, if any, such as the conscious experience of making a decision to do something, of solving a numerical problem, of winning a race, or of feeling sad? This is a large topic. But if the phenomenal qualities associated with conscious perceptual experiences can be adequately explained in self-prompting terms, then issues about other possible kinds of experience — or other kinds of consciousness in general — would become much easier to resolve. One attractive thesis is that *all* conscious experiences are either perceptual experiences, or imagistic kinds of experience that simulate perceptual experiences, such as subvocal rehearsal while thinking (Baddeley 1986; Kosslyn, 1994). This all-perceptual thesis is at least initially plausible because the self-prompting theory holds that the relevant monitored perceptual contents have a *purely representational role* in plan-activation.

When thinking, for instance, one moves around, stretches, purses one's lips, and so on. The varying proprioceptive perceptual feedback from these activities could serve, in some people, to prompt plan activation for each stage of a train of thought, even though the content of the perceptual data is completely irrelevant to what one is thinking about. The random perceptual stimuli would in effect provide a series of pegs to hang one's thoughts upon (for experimental support see Eenshuistra, Weidema, and Hommel, 2004). Each person could have characteristic patterns of such stimuli that constitute a personalized or idiosyncratic *monitoring language* for that person. Or, in more typical cases, when thinking specifically involves sub-vocalizing or other linguistic imagery, the thinker could rely on the conventional associations of words with thoughts to facilitate the relevant plan-activations. As for feelings in general, these could be closely associated with proprioceptive perceptual monitoring of bodily sensations.

Another argument for all experience being perceptual experience is an evolutionary one. If it is true, as argued previously, that rudimentary forms of perceptual experience are widespread in the animal kingdom, then presumably any higher-level conscious experiences of decision, thought, achievement and so on gradually evolved out of basic kinds of perceptual experience, since lower animals are incapable of such higher-level experiences. But on the self-prompting account of perceptual experience, there are no inherent limits whatsoever to the kinds of plans that might be prompted by perceptual experiences. So the most likely evolutionary transition from basic perceptual experience to thinking or decision-related experience would be one that reused or

exapted the same perceptual monitoring mechanisms responsible for perceptual experience for these extended, higher-level purposes (for a related thesis concerning executive control see McGonigle and Chalmers, 2006).

As for other concepts of consciousness, such as those of access consciousness (Block, 1995) and creature consciousness (Rosenthal, 1990), they could be regarded as purely derivative. For example, extreme cases of access consciousness, in which the whole brain seems to be activated, might be just the result of a very complex plan being perceptually prompted. Non-routine, monitored supervisory activity by its very nature is likely to call on a wide range of brain resources. Creature consciousness, such as being awake rather than asleep, could be explained as the presence of some perceptual experiences during the so-called awake period. So perhaps the distinct concepts of phenomenal and likeness consciousness are the only concepts of consciousness we need.

Comparisons With Inner Sense Theories of Perceptual Experience

The self-prompting theory distinguishes non-conscious perception from conscious perceptual experience. It explains the latter concept in terms of supervisory cognitive processes that monitor perceptual data in a non-metacognitive way. It will be useful to compare the self-prompting theory with a prominent group of *inner sense* or *internal monitoring* theories, which claim that a metacognitive, quasi-perceptual kind of inner scanning of perceptual processes has some connection with experience. Armstrong (1968, 1981) and Lycan (1987, 1996) provide the best known versions of these inner sense theories, plus a comprehensive independent defense by Lormand (2004).

The self-prompting theory is fundamentally different from these inner sense theories in the following respects. First, the inner sense theories assume that monitoring alone is sufficient to convert a non-conscious perceptual state into a conscious one. But the self-prompting theory denies that assumption. Monitoring makes no difference to irrelevant data, nor to data that are relevant but already accommodated by an ongoing plan. It is only relevant data that *prompt activation of a new plan* that is promoted to a conscious experiential status. The second difference is closely related to the first. None of the inner sense theories provides a clear functional role for inner sensing and the resultant conscious experience, beyond a generic appeal to introspection (see below): it is a mystery why perceptual experience might have evolved, and what purposes it might serve (Flanagan and Polger, 1995). By contrast, the self-prompting theory is a pure functional role theory. It identifies perceptual experiences with those perceptually monitored data that prompt activation of plans — many of which plans would be vital to the survival of organisms at various levels in the evolutionary chain.

Three further differences of self-prompting from inner sense theories involve a complex of three related issues of cognitive level, representation, and introspection. Inner sense theories claim that inner-sense monitoring produces a *higher-order* or metacognitive state that *represents, or is about,* the lower-order perceptual state. Hence such inner-sense monitoring also provides an *introspective* process through which a cognitive system becomes aware of perceptual data (Lycan, 1996; van Gulick, 2001). By contrast, the monitoring process invoked by the self-prompting theory is a significantly different process. A plan activated via a self-prompted monitoring process is not a higher-order representational state, it does not represent any perceptual data at all, and it provides no introspective access to these data. Indeed, the self-prompting theory could appropriately be described as involving an *inverted* monitoring process, in that it is the perceptual data themselves, rather than the monitoring of them, which have a representational role — namely that of prompting activation of some relevant plan.

This is what one would expect from a pure functional/causal role theory such as the self-prompting theory. It is the causal role of a perceptual datum in prompting a plan-activation that constitutes its phenomenal or conscious status. Hence the self-prompting theory takes no stand on issues of introspection or higher-order monitoring, which might or might not occur independently of the current plan-activating monitoring. Nevertheless, I have argued in Dilworth (2006a) that appeals to introspection are unnecessary in a significant class of cases (see also Seth, Edelman, and Baars, 2004, who argue that metacognition is not necessary for sensory consciousness). To summarize, the main point of similarity between self-prompting and inner sense theories is that both claim that perceptual data only become conscious via the activities of a monitoring process. But the relevant monitoring processes are significantly different, in the five respects identified above.

Empirical Support for the Self-Prompting Theory

The concept of perceptual monitoring invoked by the self-prompting theory assumes a rough division of cognitive processes into two groups. One group involves only low-level, automatic processes for handling routine perceptual data. These processes are non-conscious. The second group involves non-routine supervisory, executive or control processes needed to handle more problematic kinds of perceptual data via monitoring of them, which are associated with consciousness. Theories involving some concept of non-routine supervisory control have been increasingly influential in cognitive science over the last forty years or so. Hommel, Ridderinkhof, and Theeuwes (2002) in their survey describe the situation as one of "a renaissance of cognitive control." There is widespread agreement that consciousness has *some* connection

with monitoring-related supervisory or executive control processes, but as of yet there are no detailed theories of how supervisory processes relate to consciousness, that have gained general support. Instead, there has been a tendency to simply *assume* that consciousness and supervisory or executive control go hand-in-hand (Hommel, 2007; Monsell and Driver, 2000). Our understanding of consciousness has not progressed very far beyond traditional folk-psychological oppositions of unconscious habitual behavior to consciously willed or intended actions.

Among the few researchers who have directly addressed issues of consciousness, probably the most relevant support for a theory of the self-prompting kind comes from Shallice and associates. Though an early theory of consciousness did not include a monitoring component (Shallice, 1972, 1978), the papers by Norman and Shallice (1986), and by Shallice (1988) do include in their model a "supervisory attentional system" which performs monitoring functions. The Norman and Shallice model is consistent with the self-prompting theory, and its widespread adoption in cognitive science (see Shallice, 2006 for references) provides some basic empirical support for monitoring-related explanations of consciousness. However, Norman and Shallice themselves do not specifically endorse a perceptual prompting interpretation of their 1986 model. Instead they associate the traditional concept of *deliberate conscious will* with activities of the supervisory system. Shallice (1988) offers various possible views about consciousness without settling on any one of them. Also, in Shallice's more recent work (e.g., Jack and Shallice, 2001), his position on consciousness seems to have moved much closer to the metacognitive view of the inner sense theorists. Like them he now holds that an investigation of higher-order introspective knowledge of conscious states is central to an adequate scientific understanding of consciousness.

The main reason given in Jack and Shallice (2001) for the centrality of introspection is that it provides ". . . the paradigm case in which awareness is necessary for intentional action. For in this case, it is clear that the phenomenology associated with the perceptual experience plays a causal role in the production of response" (p. 170). But from the point of view of the self-prompting theory, copious evidence of the causal role of perceptual experience is already provided by cases of *non*-introspective monitoring, so the exclusive reliance by Jack and Shallice on introspective evidence of perceptual experience is unnecessarily confining (also see the related critical comments by Block, 2001). Nevertheless, as the summaries in Shallice (2006) of his own and related views on consciousness show, Shallice still holds that conscious experience is closely connected with the operations of a supervisory system, independently of issues about introspection. So his work (and that of associates and adopters) remains an important base of empirical support for further developments of the self-prompting theory.

The Self-Prompting Theory Applied to Recent Paradoxical Discoveries

Here is a brief demonstration that the self-prompting theory has an advantage over rival hypotheses in explaining certain recent paradoxical discoveries about consciousness (see the April 2001 edition of the journal *Cognition*, which is dedicated to the topic, including Block's useful summary). On the one hand, activation of definite brain areas can now be closely correlated with visual consciousness — especially the ventral stream, the fusiform face area (for face awareness) and the parahippocampal area (for place awareness). But on the other hand, under other conditions, such as damage to the inferior parietal lobes, activation *of those very same areas* results in no conscious visual experience at all. Thus attempts to find a neural basis for consciousness seem to have failed at a very fundamental level. As Block (2001) explains, as a result there is a search for a mysterious missing ingredient X, whose presence or absence could explain both the conscious and unconscious cases. In particular, X cannot be explained as activation strength for the ventral stream etc., because those areas can be activated equally strongly in both conscious and unconscious cases. But what else could X be?

The basic answer provided by the self-prompting theory is that the mysterious missing ingredient X could be one of several factors associated with the *functional differences* between non-conscious perceptual activities on the one hand, and monitoring of perceptual data on the other hand, which under the right conditions could prompt a plan activation which would promote the data to a conscious status. The "several factors" referred to are the various ways in which the monitoring process *might fail to produce normal plan-activations* associated with perceptual experience. The neurological damage to the inferior parietal lobes, or other neurological malfunctions (Driver and Vuilleumier, 2001) might either prevent the monitoring process from functioning at all, or allow it to function but prevent any plan-activations, or prevent just some particular kinds of plan-activations, and so on. Or in other words, there is a range of possible, empirically verifiable ways in which the monitoring process might be defective, any of which might be relevant to explaining particular absences of conscious perceptual experience. But as required for consistency with the initial evidence above, none of these differences need affect particular neurological factors such as activation strength in particular regions. Since the self-prompting theory depends on a relatively sophisticated hypothesis about the differing functional roles of monitored versus unmonitored perceptual activities, it need have no problem accommodating facts about the actual neurological implementations of these functions.

Conclusion

Theories associating deliberate conscious action with non-routine supervisory or executive control functions have been increasingly influential in cognitive science over the last forty years or so. But there is a significant gap in currently available theories, because none of them attempted to systematically explain *conscious perceptual experience* as such in executive control terms. One plausible strategy is to attempt to explain perceptual experience as resulting from a *functional interaction* between perceptual data and an executive control system that monitors the data. The current self-prompting theory is one such attempt.

Any theory of perceptual experience cannot avoid issues concerning perceptual content, meaning and intentionality, so an adequate theory must somehow integrate a stance on these issues with factors involving monitoring by executive control functions. One relatively straightforward approach would involve a division of labor, corresponding to the distinction between routine non-conscious perception and non-routine conscious cases. Non-conscious routine perception is about the world, and its content indicatively describes the world in ways that can be correct or incorrect. On the other hand, the content of conscious, non-routine perception is instead about the perceiver herself, and it imperatively prompts her to activate an executive control plan. That, in a nutshell, is the basic framework of the self-prompting theory. The framework also facilitates a well-motivated distinction between phenomenal and likeness consciousness.

A significant strength of this purely perceptual approach to consciousness is that it can explain how consciousness, and an indefinitely large range of perceptually driven kinds of executive control, could have evolved from a minimal role as an adaptively advantageous structure in early perceptual attention. Species whose perceptual data prompted activation of efficient executive plans for further perception of relevant items would tend to be selected over species lacking such abilities. More sophisticated forms of experiential content and prompted executive control could gradually have evolved within this same basic framework. In this self-prompting conception, conscious perceptual experience is the glue that binds non-routine perceptual inputs to executive control of them. It is a primary engine of evolutionary change, and the self-prompting theory will be justified to the extent that it can help to reveal the centrality and scope of this psychologically fundamental causal mechanism.

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