

Measuring the Fringes of Experience

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ABSTRACT: Mangan's (2001) concept of fringe consciousness is too heavily based on informal introspection, and too all-embracing to constitute a coherent family. It lacks the tight operationalisation needed to identify individual examples of fringe consciousness, and to test Mangan's theoretical account against detailed findings from empirical research. I propose a more focused two-component operationalisation of the fringe. The first component addresses how we can operationalise the *consciousness* of the fringe; here I draw lessons from research in implicit cognition, and suggest implications for the wider understanding of consciousness. The second component addresses the *informational content* of the fringe.

1. Introduction

In his recent overview of fringe consciousness, Mangan (2001, Section 3) claims to have isolated "a set of phenomenological observations and functional attributions that are self-consistent and can rightly be said to constitute a descriptive theory of non-sensory experience". Although I have a fringe feeling that Mangan is on the right track, I think his account falls short of this claim and adds relatively little to his earlier seminal essay on the fringe (Mangan, 1993). The reason for this is at least partly methodological. Mangan

attempts a very general synthesis of the fringe concept, and draws heavily on introspective illustration. But while he is correct in emphasising the importance of phenomenological data in this area, over-reliance on somewhat folk psychological introspections can leave us with a collection of theory-laden opinions, rather than the tight falsifiable operationalisations that are needed if we are to identify provisional examples of fringe consciousness, and then systematically and empirically explore the coherence of the fringe concept.

Mangan (2001) does not provide a systematic and critical mapping of his conceptual ideas to the large existing body of empirical research on specific phenomena that might be included under the umbrella of the fringe; e.g. research from the memory and metacognition literature on "Feeling of Knowing" (FOK) judgements in which people successfully rate the likelihood that they will be able to recognise items that they cannot currently recall from memory (Koriat & Levy-Sadot, 2001; Metcalfe, 2000a); or research on the influence of "perceptual fluency" on evaluative judgements (see Reber et al., 2002). Correspondingly, these more piecemeal areas of research often fail to make any direct reference to the general concept of fringe consciousness. This emphasises the need for an overriding framework which can help us to explore how different potential examples of the fringe are related to each other with respect to their phenomenology, cognitive function and neural correlates. Mangan's characterisation of the fringe is a laudable pioneering step in the right direction, but is currently too diffuse and all-embracing to provide this framework. A tighter operationalisation is again demanded.

In this paper I offer a provisional sketch for such an operationalisation. I first critique the informal introspective evidence that Mangan (2001) uses to flesh in the phenomenology of the fringe (my Section 2). I then develop two complementary sets of operational criteria for identifying cases of fringe consciousness. The first set of criteria (my Section 3) is concerned with how to operationalise whether the fringe *is conscious*, and therefore builds on the issue of how, generally, to operationalise consciousness. Here there are useful lessons to draw from the history of research on implicit cognition. I also suggest that by sitting at the interface between the conscious and the non-conscious, research on fringe consciousness can feed back into the process of understanding and operationalising the kind of beast that consciousness is. The second set of operational criteria (my Section 4) is concerned with how to define the informational content of experiences that we might want to label as "fringe".

2. Delineating the Fringe by Introspection: Mangan's Phenomenological Analysis

Mangan (2001, Section 3.3) proposes adamantly that "both phenomenologically and functionally, the fringe is a completely distinct domain of consciousness". But in the case of his phenomenological analysis, with which I begin, this claim is at best premature. Mangan spends considerable time analysing the fringe at what he refers to as a

"descriptive level", encouraging us to recognise the fringe introspectively by what it *feels* like. Despite being sympathetic to the spirit of this endeavour, my own experience of following his exercises and examples was both of introspective disagreement, and of increasingly questioning my ability to make any clear introspections at all. The result is that Mangan actually does rather a good job of vindicating the behaviourist anti-introspection arguments of which he is so critical.

2.1 The Kite-Flying Example

Take Mangan's "kite-flying" paragraph (Section 2), which is intended to read as nonsense until we are presented with the theme of kite-flying to act as an integrating schema. Mangan claims that if we are enlightened by this schema, our second reading is accompanied by a fringe "Feeling of Rightness" (FOR). This feeling of "meaning, unification, coherence, integrated whole" is argued to be a "basic non-sensory experience" and perhaps the most general and important example of fringe experience (Section 2). Mangan describes his FOR as "amorphous, fuzzy -- more like a mass of slightly compressed raw cotton-balls pervading a considerable region of consciousness than like the precise focal experience of, say, the experience on your screen of the word "this"." However, in my own case, I experienced neither cotton-balls, nor any other identifiable feeling of rightness over and above the rather complex qualia of "what it is like to be understanding what I'm reading". (*My phenomenology therefore sides me with Whittlesea et al. (2000, 2001) to whom Mangan refers but disagrees.*)

I also differ from Mangan on a second aspect of the kite paragraph's phenomenology. For Mangan, the FOR is a distinctly non-sensory experience. However the most salient phenomenological difference that I experienced on second reading of the paragraph was of an accompanying background visual imagery that reflected the semantic content of the text. So for me, any fringe feelings to do with textual comprehension were, if anything, manifested in a very sensory experience. This rather muddies Mangan's attempt to carve the fringe into non-focal sensory experience on the one hand, and the distinctly *non-sensory* experiences (whether focal or not) on which Mangan intends his target article to concentrate. For challenges to the non-sensory nature of other fringe examples used by Mangan, see Epstein's (2000) suggestion that sensory-motor phenomenology may be integral to experiences such as Tip of the Tongue (TOT), or to abstract relational fringe feelings such as "and-ness". In similar vein, the sensory experience of "perceptual fluency" - the subjective ease and speed of processing a sensory stimulus - has been implicated in many types of judgement which are routinely considered to be mediated by fringe feelings, such as preference judgements and truth judgements (Reber & Schwartz, 1999; 2001), or the Feelings of Familiarity (Kelley & Jacoby, 1998) that Mangan (Section 1) explicitly denies to be a sensory experience.

2.2 The Theory-Laden Nature of Our Beliefs About Experience

The crucial point here is not so much that one of us is correct about the nature of our fringe phenomenology and the other wrong. It is that we *disagree*. And this is a useful alarm bell to remind us of the fickle nature of open-ended introspective reports. One is reminded of the controversy that once raged in psychology over the cognitive status of reported mental images, that vary hugely from person to person. The debate was largely settled by the use of objective behavioural operationalisations of the properties of people's mental images, e.g., in terms of response times in various kinds of experiment. When we turn to so-called fringe experiences, we must be wary of the metatheoretical assumption that the experiences are neutral raw data to be introspected upon: "A vague experience is simply itself, just as it happens, just as it seems" (Mangan, 2001, Section 3.3). A more cautious view would be that our beliefs about the nature of our experiences are just that ^ i.e., beliefs. As with all beliefs they will be theory-laden, especially with regards to the holder's views on the nature of experience.

Mangan (Section 4.3) warns the skeptical reader that "a bit of effort and practice" are needed to appreciate the non-sensory dimension of experience. Then, "Once a person "gets" the non-sensory dimension of experience, he or she will immediately see what a huge role they play in consciousness...." (Section 2). However the request that we should just "get" the fringe is not a particularly strong argument. The onus here is on Mangan to explicate just what training schedule he has in mind.

The upshot is that we should be suspicious about the use of informal introspections as the sole way to qualitatively define fringe consciousness. Neither Mangan's cotton-balls, nor my visual images of kites, are particularly convincing data points in the search for Feeling of Rightness.

2.3 A Hot-Pot of Fringe Candidates?

Mangan's attempt to phenomenologically characterise a "distinct domain" of fringe experiences is made yet more difficult by the breadth of experiences that he wishes to include. In Section 1 he defines fringe consciousness as *everything* other than the "nucleus" of focally-attended sensory information. The fringe therefore includes "virtually everything else of cognitive importance in consciousness" (Section 1), of which the "list is endless" (Section 2). But if this is the case, the concept of the fringe is in danger of triviality. As Galin (1994) has warned, even the usual proposals for fringe membership constitute a very heterogenous bunch. Consider four broad groupings that seem to emerge in Mangan's paper:

a) Non-sensory transitive experiences between each substantive moment of experience:

Following James' (1890; p.243) famous "bird's life" metaphor, with its "alternation of flights and perching", Mangan (Section 5.1) argues that fringe experiences are especially dominant during the brief transitional (or *transitive*) periods of experience that punctuate the passage from one stable (or *substantive*) moment of consciousness to the

next. This "transitive/substantive cycling between vague and clear experience" is a typical part of the everyday stream of consciousness. The transitive experiences are exemplified by the fringe Feeling of Rightness that Mangan attempts to illustrate with his kite flying paragraph, but which proves more elusive than he hoped. <1>

b) The experience of "meaning":

Mangan argues that non-sensory experiences also "seem to bear meaning in consciousness" (Section 2), and that there is an intimate connection between the feeling of meaning and FOR. He even argues that in his kite flying paragraph, "the feeling of "right direction" *is* the feeling of meaning" (Section 3.6). If we accept that items in thought derive "meaning" by virtue of their relationships to further stored information, it seems plausible that the experience of meaning should be partly mediated by feelings which encapsulate this extended connectivity. Galin (1994, p. 377) agrees that evaluative or relational information present in the fringe provides "the context and web of relations that give meaning to the particularised contents in the nucleus". But again we are faced with the problem of how we are going to operationally identify such feelings, agree on their phenomenology, distinguish them from other "fringe feelings", and nevertheless include them in the same general set of experiences as other fringe candidates.

c) Routinely studied metacognitive and evaluative judgements:

Many of Mangan's fringe examples are drawn from classes of experiential judgements that have been subjected to solid empirical investigation. These include FOK judgements, TOT, feelings of being on the right track in problem solving exercises, Feeling of Familiarity, Feeling of Preference, and so on. At the collective level, these are examples of the fringy "hunches", "gut feelings" or "intuitions" that we often feel we use to guide our daily behaviour. At the individual level, these various types of judgement are tightly operationalised in terms of instructions to give particular types of introspective rating in the context of specific experimental situations. The veridicality of the ratings, as reflections of experience, is then established by their predictive correlation with future behaviour, such as memory retrieval success (Feeling of Knowing), or by correlation with previously manipulated independent variables, such as subliminal pre-exposure (Feeling of Preference).

As Mangan bemoans (Section 8), the various rating judgements are *not* usually operationalised in terms of their detailed phenomenology. But doing so is far from easy. Mangan asserts (ibid.): "The phenomenological datum in a FOK is, I would maintain, rightness." He also implicates rightness as a crucial component of the TOT state. But is the rightness to be sensed in the kite flying paragraph really the same beast as the rightness in TOT? And does one feel rightness or *wrongness* during TOT? I am not sure. While arguing for the commonality of Feelings of Rightness across widely divergent situations, Mangan also chides others for failing to realise that rightness and familiarity are phenomenologically quite distinct. But whose phenomenological reports do we trust?

d) Unattended sensory information:

Although Mangan concentrates on (what he considers to be) non- sensory aspects of the fringe, he nevertheless defines the fringe to include sensory information lying outside the focus of attention. Modern cognitive psychology usually operationalises such "preattentively processed sensory information" as information that has not received the quantitatively or qualitatively privileged (and limited capacity) processing that is awarded to selectively attended information. It is logically possible that some information of this kind might enter consciousness, as suggested by authors such as Rock and Gutman (1981; approvingly referred to by Mangan) who argued we could be aware of unattended sensory information such as simple properties of the backgrounds around focally attended objects. But this category of experience seems to bear little family resemblance to other suggested members of Mangan's fringe, such as a metacognitive judgement like FOK.

In addition, the literature on change blindness and inattention blindness (e.g., Noe & O'Regan, 2000; Simons & Levin, 1997) warns us that although we think we are aware of information we are not attending, this belief about our experience is often erroneous. The error is spectacularly revealed by our surprise at our own inability to notice large changes taking place in parts of our stimulus environment that we are not attending focally. The reason we *think* we are aware of the unattended parts of the scene, such as the colour of the wall paper, is that the very act of introspecting ("Am I aware of colour of the wall paper?") prompts a shift in attention which fills in the previously missing information. A salient analogy <2> is often used to illustrate this idea: If we want to know whether the fridge light is on, we open the fridge door to check, and the light, which is activated by the opening of the door, of course then appears to be on! The fridge door analogy provides a general sobering reminder of the danger of trusting our fringe introspections, regardless of the category of fringe in question. The lesson is that our experience of experience is not to be trusted.

2.4 Some Common Features of All Fringe Experience?

Despite this apparent heterogeneity of fringe experiences, Mangan manages to suggest some basic common features of *non-sensory* fringe phenomenology. However these features turn out to be rather dubious indicators of fringe membership.

For example, one feature is *translucence*, by which it is meant that the experiences lack sensory content of their own; but we have already questioned the ease of distinguishing between sensory and non-sensory content among some of Mangan's supposedly non-sensory fringe examples. Another example is the property of *variable intensity*; but this is hardly specific to fringe experience. A third example is the suggestion that non-sensory fringe experience has *low resolution* and is *diffuse* over the entire field of consciousness; but here the use of spatial metaphors for a non-spatial experience seems like a category error.

A final but more revealing common property of fringe experience proposed by Mangan is its *vagueness*. Galin (1994, 2000) has criticised this characterisation, arguing that

"vagueness" is itself rather a vague term, and that some fringe experiences such as Tip of the Tongue are not vague at all, but are intense, long lasting and highly specific. However Mangan does have a point here, since many fringe experiences do seem to be *descriptively* vague in the important sense that we find it hard to describe them verbally both to others and to *ourselves*. Hence Mangan (2001, Section 1) is forced to admit of the Feeling of Familiarity that "just *how* it feels is ...obscure". This may explain the temptation to grasp at inappropriate metaphors such as the "low resolution" of non-sensory experience. The vagueness problem is symptomatic of the difficulties of phenomenologically identifying and communicating fringe experiences, with consequences for operationalising the fringe that are expanded on further below.

2.5 The Need For Tighter Operationalisation

So far it would seem that Mangan's attempt to characterise the fringe phenomenologically suffers from three major problems. First, by taking a starting point which includes anything which qualifies as either non-sensory, or unattended, or both, he ends up with a rag bag of very diverse experiences. Second, it is dangerous to rely too heavily on our theory-laden beliefs about our experiences as primary data. Third, one of the most pertinent general characteristics of proposed fringe experiences is, by Mangan's own admission, the difficulty of describing and communicating fringe feelings.

I quite agree with Mangan (and with Galin, 1994) that by ignoring the nature of fringe experience, we risk ignoring the explanandum. However the phenomenological exploration cannot be driven solely by open-ended introspection. What other avenues are open to us? In many experimental studies of experiences which Mangan considers examples of fringe consciousness (TOT, FOK, etc.), phenomenology is addressed, if not explored, within a carefully operationalised situation, using introspective self-report ratings of particular, defined dimensions of experience, and these introspective ratings are validated in terms of their correlation with other behavioural measures. For example, subjects might rate the strength of a Tip of the Tongue feeling and it could then be shown that ratings were predictive of subsequent recall from memory (Brown, 1991). Rating methods of this kind can then be expanded to explore phenomenology more systematically, while still within a controlled experimental situation. Mangan is correct that this is not usual practice, but as a perhaps crude example of the possibilities, Price (2001) describes how batteries of introspective self-report ratings can be applied in this way to explore the phenomenology of subjects who are making forced-choice guesses about the content of subliminally presented visual displays. Another important avenue is to explore the variables that affect self-rated experience and resulting behaviour. Here, the work of Reber et al. (2002) on the experience of perceptual fluency, and its role in mediating various types of judgement, provides an excellent example.

But how are we to decide which of these individual, carefully operationalised experimental situations is revealing examples of "the fringe"? The crucial question is whether we can construct a *general* operationalisation of fringe consciousness which: (1)

will turn out to embrace at least a substantial subset of proposed fringe experiences; (2) is specific enough to be falsifiable (and to be potentially integrated within computational models of general cognitive architecture); (3) incorporates the experiential level of description of the fringe, which as Mangan rightly points out is the *raison d'etre* of the fringe concept; (4) captures the functional role that the information content of the fringe is playing in cognition.

In other words, given any particular situation, how do we actually measure in practice whether there is a fringe experience present?

3. Operationalising the Fringe: Part 1 - Measuring Consciousness

Ask a classroom of students whether intuitions and hunches are conscious or non-conscious, and opinion will be divided. Ask experimental participants to rate their awareness of peri-liminal sensory stimuli, which are the target of "guessed" discrimination judgements, and you will witness great variation in claimed awareness despite similar levels of discrimination performance. Fringe experience can seem to sit somewhere in the no-man's land between the conscious and the non-conscious. Koriat (2000) recognises this ambiguous aspect of fringe experience in his discussion of metacognitive feelings which he claims have a foot in both camps. So just why would the fringe qualify as fringe *experience*? To resolve this we need to address the crucial point of how to operationalise conscious experience in general, a topic which Mangan (2001) neglects.

The methodological debate over how to operationalise consciousness has never been thrashed out more thoroughly than in research on implicit cognition. To argue that a stimulus has been non-consciously perceived, it is necessary to measure whether the observer was, or was not, conscious of the stimulus. And to argue that a complex rule has been non-consciously learned, it is necessary to show whether the experimental participant was, or was not, conscious of the rule. Over the history of research on implicit cognition, the approaches used to operationalise consciousness of some particular information can be grouped into three broad categories: (1) introspective self-report measures of consciousness; (2) "objective" forced-choice discrimination measures; and (3) measures based on qualitative differences between conscious and non-conscious processing. I now discuss each of these in turn, together with their merits or drawbacks, and their application to operationalising the fringe.

3.1 Introspective, Self-Report Measures

A traditional way to establish the presence of some kind of conscious experience is to adopt the criterion of (usually verbal) reportability, and collect introspective reports from experimental participants. This was the approach used in early experiments on non-conscious perception, where introspective reports were used to assess whether participants were consciously aware of sensory stimuli presented to them at peri-liminal energy intensities (e.g., Sidis 1898). Absence of claimed awareness, combined with above-chance performance on some kind of forced-choice "guess" about the target stimuli (e.g., identification), was then interpreted as an example of non-conscious perception. In more contemporary research, experimenters sometimes test whether accuracy in making a perceptual discrimination is positively correlated to more formal trial-by-trial confidence ratings, and, if not, it is usually assumed that subjects do not have conscious access to task-relevant information.

As pointed out in Section 2.5 above, many experimental paradigms of relevance to fringe research actively seek the presence of correlations between well defined introspective ratings (e.g., FOK judgements, TOT ratings, etc.) and some independent behavioural measure of information processing. Such correlations are used to infer conscious awareness of fringy "hunches" or "feelings" which are predictive of future behaviour, even if such feelings are vague and difficult to describe verbally. In order to decide which dimensions of experience are the most appropriate candidates for systematic testing in this way, rating experiments can of course be preceded by more open-ended and exploratory subjective reports of ongoing subjective experience, which do not prompt for information on specific dimensions, and which are then subjected to systematic content analysis.

However, there is a methodological drawback to the use of introspective reports as a criterion for conscious awareness - the problem of conservative response bias. In research on non-conscious perception, it has long been recognised that observers might, for example, experience fleeting glimpses of stimuli presented on a screen, but lack confidence in what they saw, and so report they saw nothing.

The problem of response bias is equally relevant to research on fringe consciousness. Here, conservative response biases will tend to hide the existence of vague intuitive feelings from exposure by verbal report measures, and if fringe experiences are as vague and difficult to describe as even Mangan is prepared to admit, this is not a trivial problem. Mangan (1993, 2001) suggests that many assumed examples of implicit cognition, such as subliminal perception, may sometimes be mediated by fringe feelings which remain undetected for this reason.

Furthermore, inability to introspectively rate one's conscious feelings may lie deeper than with response biases which could perhaps be overcome with a bit of practice, some prodding by a skilled interviewer, or the use of finer grained introspective rating scales. It may result from a genuine inability to express the feelings in words (or other labels), even to ourselves. Schooler and Engstler-Schooler (1990) have studied how the very attempt to translate non-verbal experiences into words can prevent us from accessing the quality of our previous experience. The suggestion that conscious feelings are not always

possible to label verbally also been made by Metcalfe (2000b). But then how *do* we measure the presence of the conscious experiences?

3.2 Objective, Forced-Choice Discrimination Measures

In the field of non-conscious perception, one solution introduced by Merikle and his co-workers (Cheesman & Merikle, 1984) was to differentiate between "subjective" and "objective" criteria for consciousness. An introspective report, verbal or otherwise, was classed as a subjective criterion, and the point on a psychophysical function where observers no longer claimed to have any subjective experience of the presented stimuli was taken as their "subjective threshold". By contrast, the "objective threshold" was defined in terms of chance performance on some kind of objective forced-choice test of stimulus awareness, such as forced-choice identification judgements or presence-absence judgements. In practice, subjects who have reached their subjective threshold of stimulus awareness (e.g., zero confidence in their ability to detect the presence of a target) will often show above-chance accuracy on a comparable objective forced-choice discrimination (e.g., "guessing" whether a target was shown or not). (For an application of this distinction to research on implicit learning, see Dienes & Berry, 1997.)

Because this type of "objective" behavioural test is more resistant to response bias artefacts (especially if conducted as a strict forced-choice procedure with appropriate Signal Detection Theory precautions), it has been adopted as a "conservative" measure of consciousness in many studies of non-conscious perception. Typically such studies attempt to show that the semantic content of subliminal stimuli can bias subsequent behaviour, for example by exerting priming effects, even when performance is at chance on a given objective measure of stimulus awareness (e.g., Greenwald & Draine, 1997; Kemp-Wheeler & Hill, 1988).

The logic of "objective" behavioural measures of consciousness can be applied to experiments on fringe consciousness where participants might be unable or reluctant to introspectively rate their feelings. Fringe awareness of relevant information would be defined in terms of the ability to make non-random forced-choices between a small number of alternatives, using a task that is unlikely to engender a response bias. For example, in the context of a Feeling of Knowing experiment, we might be required to rank order a small number of memory cues, such as word stems, according to our expected future ability to recognise the completed stem as novel or previously exposed (Metcalfe, 2000a), rather than using a verbal rating to express the strength of our *felt FOK* towards a single stimulus.

But this approach also has a problem. It is overly simplistic to assume that behaviour in forced-choices tasks of this type is exclusively influenced by *consciously* represented information (Reingold & Merikle, 1988). Even if forced-choice discriminations *feel* like completely random guesses, they might still be automatically biased by non-consciously processed information, in the same way as indirect measures of processing. Consider how

this problem could contaminate interpretation of experiments that looked for evidence of fringe feelings:

In the Mere Exposure paradigm, participants show a small tendency to prefer (Feeling of Preference) perceptual stimuli to which they have previously been exposed (Kunst-Wilson & Zajonc, 1980; Bornstein, 1992), even in the absence of any explicit recognition of having seen those stimuli before. It has long been suggested (Bornstein & D'Agostino, 1994; Jacoby et al. 1989) that these preference biases, or Feelings of Preference, are based on a conscious feeling of "perceptual fluency" which Reber et al. (2002) consider as an example of fringe consciousness and characterise as the experience of processing speed and ease. Whereas some studies measure Feelings of Preference by asking participants to rate the strength of their *felt preference* towards a single stimulus (Bornstein, 1992), others look for a bias on forced-choice "preference judgements" between pairs of stimuli, one of which has been pre-exposed, and one of which is novel (Kunst-Wilson & Zajonc, 1980). In the case of a forced-choice task, non-conscious processes might automatically bias us to choose the pre-exposed stimulus rather than the novel foil, even if we felt we were guessing randomly in the absence of any a fringe Feeling of Preference.

In conclusion, the use of "objective" forced-choice discrimination tasks to measure fringe consciousness is not necessarily an improvement over the use of "subjective" introspective reports. Although an objective measure may reveal conscious information that was obscured by a response bias, it may also merely reflect the influence of non-consciously represented information. Above-chance performance on an objective forced-choice measure is therefore inappropriate as a sole criterion for consciousness of task-relevant information.

Note that this conclusion has an important consequence for the way in which introspective ratings are used to search for fringe consciousness. Take a situation where subjects are encouraged to use rating scales on a trial by trial basis, and encouraged to employ the entire scale: behaviour may just end up as a fancy forced-choice discrimination in which experimental participants guess one of several values on the scale. If implicit processes can bias such guesses, the resulting distribution of ratings might not reflect conscious feelings at all, even if the ratings correlate with performance on other behavioural tests. It is therefore methodologically prudent to collect introspective ratings on several dimensions. If many different rating measures turn out to be predictive, then alarm bells should sound. For example, Mandler et al. (1987) reported that subliminal pre-exposure not only increases subjective ratings of "liking" visual stimuli, but also increases ratings of "darkness" or of "lightness". But if only one closely relevant rating measure is predictive, then there are better grounds to assume it reflects conscious experiences (e.g., see Price, 2001, Section 1.3).

3.3 Measures Based on Qualitative Differences Between Conscious and Non-Conscious Processing

To by-pass the inherent drawbacks of introspective reports and of forced-choice discrimination tasks, implicit cognition researchers have exploited the observation that consciously and non-consciously mediated behaviour differ qualitatively in their flexibility and sensitivity to context, conscious expectations and instructions (Merikle & Daneman, 1998; Merikle & Joordens, 1997). Consciously mediated behaviour seems to be sensitive and adaptive to such variables, whereas non-consciously mediated behaviour is much more automatic, inflexible and insensitive in this manner.

For example, if asked to complete a word stem with the first word that comes to mind, people will be more likely to complete the stem with a word that they have recently been exposed to, whether the pre-exposure was conscious or non-conscious (Merikle & Joordens, 1997). But if asked to *avoid* completing the stem with pre-exposed words, then the instruction will only be complied with if pre-exposure was conscious. Non-consciously pre-exposed words will continue to exert the same inflexible bias as before.

Converging data from many experiments of this kind have been argued to vindicate the assumption that conscious representations can be identified by their flexibility in response to changing context and instructions (Jacoby et al., 1997; Merikle & Daneman, 1998; Merikle & Joordens, 1997). As a criterion for conscious awareness, the qualitative properties of behaviour can therefore supplement, and sometimes replace the use of subjective measures of claimed awareness <3>. This way of operationalising what we mean by conscious awareness is also very convergent with cognitive frameworks such as Baars' (1988) Global Workspace model in which consciousness is functionally defined in terms of the *global accessibility* of information, allowing the information to be integrated flexibly with contextual demands and executive goals.

The use of global accessibility as an operational criterion for consciousness might prove useful in the search for fringe feelings which are difficult for people to express in terms of verbal ratings. If people were able to use "hunches" in a flexible way, then we might conclude that their behaviour was driven by conscious information, despite an inability to express the information in introspective ratings. Consider a (crude) example from the Mere Exposure paradigm. If participants are asked to choose which of two stimuli they *dislike*, rather than the one they prefer, then they tend to *avoid* the pre-exposed stimulus (Seamon et al., 1998). This could be interpreted as provisional evidence that the judgements are more than automatic orientation responses, and are instead based on globally accessible information which is used in a flexible manner to comply with task instructions.

3.3.1 Global Access Without Introspective Reportability: An Example

Preliminary findings from an experimental study in progress (Price et al., 2001) provide a further potential example of global access to fringe feelings, even in the absence of an ability to verbally report the feelings. In this study (modified from a paradigm of Graves & Jones, 1992), participants try to "guess" the location of a brief visual target (a circle) on a computer monitor. On each trial, the target's location is obscured (or "masked") by immediately flashing a distracting visual pattern (a backward mask) in each of the several

locations that the target could have appeared. Participants are nevertheless required to rapidly reach out and touch the screen location in which they "guess" the target has flashed, responding intuitively and following their gut feelings even if the task seems nonsensical.

Despite claiming to guess, denying awareness of targets, and failing to show significant correlations between post-trial confidence ratings and localisation accuracy, participants routinely show above-chance localisation accuracy. In this respect, they resemble blindsight patients with hemianopia, whose visuo-motor localisation of targets in their subjectively blind field can be above chance in the absence of claimed awareness of the targets (Weiskrantz, 1980). Curiously however, the same participants show identical levels of localisation accuracy when, instead of attempting to point directly to the target location, they are required to employ a more complex stimulus- response mapping; i.e., they must now point to a location whose spatial relation to the target varies from trial to trial, and is dictated by a cue which only appears on the computer after the target and masks. This more complex task requires the flexible integration of target information with a varying contextual demand - the kind of behavioural global accessibility that is very much the hallmark of a conscious representation.

If consciousness is operationally defined in terms of the ability to make introspective reports such as verbal ratings, then the participants are localising targets non-consciously. If it is operationalised in terms of global accessibility to information on some more objective behavioural test, then they are using conscious information to guide their behaviour. A way out of this apparent contradiction is to suggest that performance is guided by hunches, Feelings of Rightness, attractions to a particular location, that are globally accessible but not easily verbalised or communicated.

Experimental observations of this kind have practical implications for operationalising fringe consciousness. They also have wider theoretical implications for our more general understanding of what kind of beast consciousness is.

3.3.2 Practical Implications for Operationalising the Fringe

Given the problems with trying to operationalise fringe consciousness using criteria of either introspective reportability or of above-chance forced-choice discrimination, a complementary approach is to use the global accessibility criterion: information can be regarded as consciously represented if it can be used as the basis for flexible behavioural responses in accordance with novel and unpredictable contextual demands. This operationalisation escapes the response bias problems of subjective ratings. It also (by definition) resists the influence of automatic implicit processing that contaminates simple forced-choice discrimination measures.

In certain situations, global accessibility and subjective reportability may dissociate. The information on which we base our behaviour may sometimes be available to us in the form of "intuitions" or "hunches", but we may have little in the way of a metacognitive representation of the nature of these hunches. They may be almost impossible to verbally

describe or use as the basis for systematic introspective ratings. We may not think they feel much like they are conscious. But in the sense that they are globally accessible, the hunches can be stipulatively defined as one class of fringe experience.

3.3.3 Implications for the "Construction" of Consciousness

Returning for moment to the experiment on localisation of masked targets that was summarised in my Section 3.3.1, can we be more precise about the *type* of information to which participants in this paradigm have global access, but appear unable to report introspectively? Given existing evidence that the "spotlight" of visual attention may be drawn to the location of non-consciously perceived stimuli (Lambert et al., 1999; McCormick, 1997), a plausible candidate is that participants access information about rapid, automatic shifts in attention that are caused by the masked targets (a form of exogenous attentional cueing), and then tend to guess that the target is where their attention happens to have landed. But, despite being able to use the attention-shift information flexibly (e.g., in accordance with complex stimulus-response mappings), participants do not have a metacognitive representation of what they are doing. If they did twig that attention shifts were the basis of their correct localisations, they might feel more as if they were responding consciously, albeit in a fringy way. If *I* take part in these experiments myself, then I not only have conscious access to the antecedents of the feeling - i.e., attention shifts - but I also have a knowledge of perceptual psychology that enables me to understand and verbally label what is going on. And the shifts of attention *feel* conscious!

So what is going on here? Do the naive subjects exhibit Baars' (1988) global access in the absence of subjective awareness? Or do they possess subjective awareness in the absence of a Dennettian (Dennett, 1991) internal verbal dialogue about what is going on? Perhaps these are false dichotomies. The issue is not whether the subjects were responding on the basis of conscious information. It is whether they *believed* they were responding on the basis of conscious information. This belief is a construction whose gradual progress needs to be reflected by the sensitivity of our operationalisations of consciousness.

Mangan (2001, Section 4.1) proposes that even a "very weak and ill- defined experience is still an experience." But what does this mean? Perhaps fringe consciousness can play a crucial role in refining our understanding of what it means to say somebody's behaviour is driven by consciously represented information. There seem to be instances where an anomalous gap can be found between the emergence of global accessibility of information, and the development of the belief that we are conscious of the information, and the gap is populated by a gradation of what have been referred to as fringe experiences. In other words, some fringe experiences occupy a no-man's land between what is normally regarded as conscious and non-conscious. What they expose us to is the act of consciousness in the making.

The exciting possibility, from an empirical point of view, is that the anomalous gap can sometimes close. We can *learn* to become more conscious. The naive subject who does not really know what they are doing can graduate into somebody with a definite feeling

of some kind, and eventually into somebody who believes they are making conscious controlled decisions. A similar dynamic process has been reported for subjects gradually learning the rules of a simple card sorting task (Bechara et al., 1997). Future studies of perceptual or conceptual learning therefore need to study the variables that might differentially affect the various components of this dynamic process.

3.4 Operationalising Whether the Fringe is Conscious - A Summary

Operationalising fringe consciousness is not a black or white affair. The construction of conscious representations is a dynamic process, and various examples of what has been called the "fringe" may occupy different points in this process. Perhaps the most appropriate approach to operationalising the consciousness of any given information that is proposed to be carried in the fringe, is therefore to characterise it with respect to a battery of operationalisations. These can be regarded as complementary layers of evidence. Following the arguments above, we can characterise fringe information as conscious if:

Criterion 1: It is expressed in subjective self-reports, such as formal introspective ratings of experience along a relevant dimension, which are predictive of future performance on another behavioural measure of the information's influence. To avoid the possibility that the self-reports are just non-consciously biased guesses, predictive ratings should only be found on a subset of possible rating dimensions and Criterion 2 (see below) should be found to apply. Because of the problems of response bias, and of communicating non-verbal feelings, failure to find predictive introspective ratings need not imply the absence of fringe experiences if Criterion 2 is found to apply. Where predictive ratings are not observed, alternative categories or scales of rating should also be attempted.

Criterion 2: It can be used in a globally accessible manner to guide behaviour flexibly in accordance with novel and unpredictable contextual demands.

4. Operationalising the Fringe: Part 2 - The Contents of the Fringe

Having considered the problem of how to operationalise whether fringe information is *consciously* represented, we can now turn to *the nature of the information* carried by fringe consciousness. Is Mangan (2001) correct in asserting that the fringe carries a functionally distinct class of information? If so, can we operationalise this class of information in a way that encompasses at least a substantial subset of the various fringe examples discussed by Mangan?

4.1. "Feelings of Relation" are Metacognitive Experiences

In describing the contents of the fringe, Mangan (2001) focuses on what he (following James) calls "feelings of relation" between the current nucleus of consciousness and background "contextual information". This context can consist of other contents of consciousness, or of ongoing non-conscious processes that are relevant to, or potentially linked to the conscious nucleus. The feelings of relation provide a "summary", in consciousness, of this relevant background context. Mangan considers that the most important fringe feeling of relation is that of "rightness", which acts to signal the degree of "fit" or integration between the nucleus of consciousness and its non-conscious context. In summary, Mangan seems to be proposing that fringe experiences are conscious representations of relationships (especially relations of fit) to a context which can itself be either conscious or non-conscious.

This description of Mangan's fringe bears a striking similarity to what Koriat (2000) calls "experienced-based metacognitive judgements". These are characterised as "sheer metacognitive feeling" (ibid., p. 163) in which metacognitive knowledge is expressed as subjective feelings derived from implicitly processed information, rather than derived by explicit inference from consciously represented information. Such "direct unmediated experience" is of the type that people sometimes refer to as "an intuitive feeling, a hunch" (ibid., p. 152). As with Mangan's fringe, these metacognitive feelings serve both a monitoring role, and a control role in regulating cognitive processes and behaviour. They provide "a conscious summary representation of a variety of unconscious processes" (ibid., p. 163), and "serve to interface between implicit-unconscious-automatic processes on the one hand, and explicit-conscious-controlled processes on the other" (ibid., p.152). Koriat even uses similar illustrative examples to Mangan, such as Tip of the Tongue states, and FOK judgements.

Despite their conceptual overlap, Koriat and Mangan do not appear to refer to each other's work. However Koriat's characterisation of metacognitive experience is very useful in helping us to unpack the contents of Mangan's fringe.

First, Koriat clarifies the idea of conscious feelings which derive from currently inaccessible, non-conscious information: Metacognitive feelings are proposed to be "implicit as far as their antecedents are concerned, but explicit as far as their phenomenal status and behavioural consequences are concerned" (ibid., p. 154). Koriat's "implicit antecedents" seem to correspond closely to Mangan's idea of "non-conscious context".

A second benefit of Koriat's characterisation is, by definition, his focus on the metacognitive nature of the types of conscious feelings he is interested in. This suggests the idea that Mangan's "feelings of relation" could be thought of more precisely as a form of metacognitive knowledge. In fact the *metacognitive content* of fringe feelings might be a very useful general way to characterise what we mean by the fringe. For example, Mangan's Feeling of Rightness, or "fit", can be thought of as a metacognitive representation of a particular state of affairs that holds between different knowledge structures. Metaphorically speaking, we are conscious of the relational linking arrows,

but not the entities linked. Other traditional examples of fringe consciousness also seem to qualify as the qualia of certain forms of metacognition - FOK, TOT, familiarity, preference and so on all reflect knowledge about our mental processing. Awareness of shifts of visuo-spatial attention, proposed in Section 3.3.3 above as an explanation of subjects' ability to localise masked targets, can also be thought of as a form of metacognitive knowledge. In this example, there appears to be fringe awareness of an attention shift without access to the antecedents of the shift (i.e., the subliminally presented information).

The criterion of metacognitive content also seems useful in constraining membership of the class of experiences that can be regarded as "fringe". For example, the perceptual judgement of the distance of an object manifests itself as a *direct experience* of distance, which represents a *relationship* (in this case metric) to *background contexts* (the position of another object), and which is derived from *non-conscious antecedents* such as the introspectively inaccessible processes of stereopsis. I have already argued that the distinction between sensory and non-sensory experience is a shaky criterion for fringe membership, making it difficult to exclude feelings of depth from the fringe solely on grounds on their sensory nature. However it is easier to argue that feelings of depth, although expressing a relationship between various pieces of internally represented information, do not express a *metacognitive* relationship.

4.2 Fringe Experiences Feel Anomalous

Prototypical fringe experiences have one further characteristic: the gap between the experience and its non-conscious antecedents is somewhat anomalous or unexpected. When we experience the distance of an object, or the curiosity of a face, we do not typically notice the absence in consciousness of the antecedent processes. However when we intuitively prefer one painting to another, or feel a face to be familiar in the absence of any episodic recall of having met its owner before, our judgements feel like intuitions to the extent that we notice the absence of *conscious* supporting evidence that is otherwise often present. Mangan (2000) echoes this view when he proposes that a salient component of Tip of the Tongue states is the unusually long delay in accessing the information at which the feeling of imminence is directed. Note that it is in exactly these kinds of situation that fringe experiences have been empirically studied; e.g., researchers are interested in the predictive value of Feelings of Familiarity when they occur in the *absence* of episodic recall.

4.3 Operationalising the Contents of Fringe Experiences - A Summary

On the basis of these points, the contents of fringe experiences can be provisionally operationalised as follows:

Criterion 1: The contents of consciousness can be regarded as fringe experiences when they represent metacognitive relationships involving information that is to various degrees inaccessible to consciousness.

Pending the systematic collection of normative data on the types of experience that feel most "fringe-like", we can also add the following qualification:

Criterion 2: In prototypical fringe experiences, the gap between the experience and its non-conscious antecedents is especially salient because, in other situations, similar experiences *would* be accompanied by conscious access to their antecedents.

4.4 Which Fringe Candidates Fit These Operationalisations?

Having proposed how to operationalise both the consciousness of the fringe, and the nature of its contents, we can now consider which of Mangan's proposed fringe examples (see my Section 2.3) are likely to qualify.

Promising candidates would seem to include the hunches and intuitions which, as Mangan (2001, Section 6) says, are used to make "judgements with consistency and, often, with conviction" despite being "often unable to identify the precise phenomenological basis for their judgements". The traditional targets of empirical study such as Tip of the Tongue, Feelings of Knowing, of Familiarity, of Preference, of Rightness, of being on the right track, and so on, fall into this group (and correspond to category "c" of the fringe candidates outlined in my Section 2.3). Implicit learning or perception paradigms, whether in normal subjects or brain damaged patients (such as some classes of blindsight patient), might provide further candidates.

Other examples proposed by Mangan are less promising. The fleeting fringe feelings that Mangan attributes to transitive moments of consciousness, intervening between each substantive moment (category "a" in my Section 2.3), look difficult to fit with the proposed set of operationalisations. Mangan may be correct that such experiences occur as part of the "process that normally "calls" new information into consciousness" (Mangan, 2001, Section 1), but the jury is out until these can be systematically operationalised and empirically confirmed. The phenomenology of "meaning" seems to be a less disputable component of the contents of consciousness (category "b" in my Section 2.3), but it is not obvious that it belongs to the same family of experiences as hunches and intuitions. The contents of Mangan's "sensory" fringe (category "b" in my Section 2.3) undoubtedly colour the contents of consciousness but they belong to yet another family of experience which seems best characterised as the products of preattentive sensory processing.

4.5 Variables Left Open by the Proposed Operationalisations

Conscious experiences that qualify under the proposed operationalisation of the fringe will still be free to vary along several dimensions.

First, the fringe representations will vary progressively along a dimension from global behavioural accessibility at a non-verbal level, to salient, individually characteristic, and verbally labelled feelings.

Second, there will be variation in the nature of the non-conscious context information to which the metacognitive relational feelings refer, and in the type of metacognitive information represented in fringe consciousness.

Third, the extent to which the non-conscious context information is unavailable to consciousness will vary (for further discussion of this point, see Norman, 2002). It could suffer from delayed access, as in Tip of the Tongue. Alternatively, the information may never become available, as in implicit learning tasks involving a very complex rule (Lewicki et al., 1997). In the latter situation, it is of course important to bear in mind that *some* aspects of the complex learned rule could become available to consciousness, while others remain hidden.

5. Conclusions

One of the issues left relatively untouched in Mangan's account of the fringe is the nature of the neurocognitive correlates of fringe experience. Mangan does not provide a detailed cognitive/functional level account of exactly what is meant even by his favourite fringe experience - the experience of a relationship of fit, or Rightness. He does however speculate that its neural correlates could be related to goodness-of-fit metrics in neural networks. Others have proposed alternative accounts. Koriat (2000) argues that metacognitive experiences are not based on the output of specialised internal monitors, of the type which Mangan suggests might be involved in detecting goodness-of-fit. Instead, such experiences are the product of unconscious inferences based on heuristic "mnemonic cues"; e.g., in FOK judgements, one heuristic is the number of partial cues available from memory, and this heuristic is employed because we have learned that it is usually a good predictor of subsequent memory recall. Following yet another track, Epstein (2000) proposes that fringe experiences derive from the functions of associative memory networks located in the medio-temporal hippocampal system. These evolved to represent spatial relationships, but are suggested to now also mediate navigation in "mental space" by representing more abstract relationships. The use of this relational information in directing the course of mental processing is in turn controlled by executive frontal systems.

Communication between the proponents of these various theoretical positions appears however to be lamentably absent. This again stresses the need for a commonly acceptable operationalisation of fringe consciousness to facilitate dialogue between authors who, despite their differing terminology, do seem to be addressing overlapping phenomena.

I have suggested the outline of such an operationalisation, which addresses both: (1) how in practice to assess whether conscious mental representations are present, and (2) the type of representational content that might form a coherent fringe-family grouping. The range of experiences that qualify under this operationalisation will be smaller than under Mangan's formulation of the fringe as everything outside focal sensory awareness. However the operationalisation still seems to encircle a sizeable range of fringe candidates, clustering around the folk psychological category of intuitions or hunches.

The proposed operationalisation is of course only a methodological tool. But it is an indispensable tool. It lays out more precisely the questions we need to ask when attempting to identify any given instance of fringe consciousness. It therefore equips us to map the internal structure of similarities and differences within the proposed family grouping. It allows us to begin assessing whether the existing empirical data base can be integrated under a more general conceptual framework along the lines that Mangan or others propose. It provides a base from which to launch co-ordinated empirical tests of the coherence of the fringe concept at phenomenological, functional and neural levels. And it suggests how we should go about looking for the unsuspected involvement of fringe consciousness in experimental paradigms such as implicit perception and implicit learning. This ground-work will also lay the foundations for addressing very practical issues such as individual variation in the experience and use of fringe consciousness, and the scope for training fringe awareness both in normal and clinical settings.

Last but not least, studies of fringe experiences, and in particular their dynamic evolution over time, may provide a very useful methodological and theoretical handle on the nature of conscious experience itself.

Notes

<1>. Consider a possible reason. James (1890) appears to have reckoned (see Epstein, 2000) that conscious thought is temporally continuous (the *stream* of consciousness), even though its content obviously changes from moment to moment. This belief about the nature of conscious experience helped to prompt the suggestion that shifts between successive substantive moments of thought must be bridged by a transitive moment of thought containing various fringe experiences such as a faint memory of the preceding thought, a feeling of relation between current and other thoughts, and a feeling of tendency for where the thought was going. So for James, the existence of transitive fringe experiences was a theory-laden belief about the nature of his experience, not just a neutral introspective observation. Other people, especially in meditative traditions, are struck by the introspective *non*-continuity of the stream of consciousness. They may be rather less likely to believe they are having transitive fringe experiences of the type suggested by James.

<2>. Ronald Rensink and Daniel Simons, verbal communication.

<3>. Jacoby and co-workers (Jacoby & Kelley, 1992; Jacoby et al., 1997) have formalised this approach in their now widely used Process Dissociation Procedure. The procedure compares experimental tasks in which the instructed behavioural responses will benefit from the inflexible, automatically guided processes of implicit cognition, with tasks in which the desired behaviour will be opposed by implicit cognition. In situations where behaviour is mediated by a mixture of both conscious and non-conscious cognitive processes, comparison of overall performance under the two contrasting instruction-conditions allows the relative contribution of conscious and non-conscious processes to be calculated.

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