What Makes Behavioral Measures of Consciousness Subjective and Direct?

Abstract

This article addresses two issues: the distinction between objective and subjective measures and the directness of such measures. It is argued that the distinction is unambiguous only when based on a methodological criterion (i.e. the threshold utilized by the measures) rather than a semantic one (i.e. their referring either to the world or to the participant's inner states). Different senses of *directness* are discussed: metaphysical (which seems to rest on a category error), methodological (the only unambiguously defined one, though relating 'directly' to performance rather than awareness), semantic (which appears gradable), and causal.

Keywords: measures of consciousness, subjective measures, objective measures, direct measures

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1. Introduction

In recent decades, much has been said about the different behavioral procedures designed to measure *awareness* (or, if one prefers, *consciousness* – these two terms being employed for the most part interchangeably). Such measures are traditionally divided into two categories: *subjective* and *objective* (Timmermans and Cleeremans 2015). Despite significant problems of both a methodological and a theoretical nature, and growing criticism or even pessimism about the whole project (Michel 2019; Irvine 2013, 2019; Phillips 2016; Klein and Hohwy 2015; Persuh 2018), the debate over measures of consciousness is far from over. Modified or novel procedures are still being proposed (see, e.g., Maniscalco and Lau 2012, 2014; Wierzchoń et al 2019), while existing ones are becoming ever more sophisticated and being applied to an ever greater variety of cases. Although the present article mentions some of the major and well known problems associated with behavioral measures of consciousness (e.g. exhaustiveness, exclusiveness, biased processing, and validity), its main concern is a more modest one, centering on two rather basic issues: namely, the distinction between subjective and objective measures of awareness, and the directedness of such measures. We can find at least two different ways of understanding the above distinction in play in the literature, and by developing two opposing objections examples, the present article sets out to show that the element of ambiguity produced by this state of affairs engenders varying objections and/or misinterpretations. On the other hand, claims about a given measure exhibiting a more or less (or a maximally) direct character (Sandberg et al 2010; Persaud et al. 2007) coexist with statements casting doubt on such directness (Wierzchoń et al. 2014) or even explicitly

declaring all measures of this sort to be indirect (Seth 2008a, 2008b; Pasquali et al. 2010; Timmermans and Cleeremans 2015). Since there exists only one proper definition of *directness* for a given measure in the literature (namely, that proposed in Reingold and Merikle 1988), and this does not seem to have been applied unambiguously in the current discussion, the questions of what we really mean when we say of some measure that it is direct, and whether its directness should be regarded as a desirable feature, seem pertinent. Consequently, the primary aim of the article is to achieve some real clarity about issues that have previously only seemed straightforward – or, at least, to render them sufficiently well-defined to furnish answers to two rudimentary questions: what makes a given behavioral measure subjective, and what makes it direct (or at least more or less direct). At the very least, the hope is that in the light of this discussion, it will be clear that anyone basically inclined to believe that subjective measures are subjective in virtue of exemplifying a direct and first-person-based approach, while objective ones correspond to what is disclosed in an indirect and third-person-based way, has at best an overly simplistic overall grasp of the issues involved.

2. The Subjective *versus* Objective Distinction

This part starts out with a brief description of the most common subjective and objective measuring procedures, followed by a presentation of two opposing objections to that very distinction itself. In the closing subsection, two possible ways of understanding that

distinction are described – these being, respectively, a methodological and a semantic one. In this context a brief justification is offered for why we should prefer the former over the latter.

2.1 Subjective and Objective Measures

Let us begin by mentioning, from amongst the *subjective measures* most commonly discussed in this ongoing debate, the following three procedures (cf. Timmermans and Cleeremans 2015): *Perceptual-Awareness Scale* (PAS) (Ramsøy and Overgaard 2004), *Confidence Ratings* (CR) (Dienes et al. 1995), and *Post-Decision Wagering* (PDW) (Persaud et al. 2007).

PAS is based on an explicitly introspective report as regards quality of experience. One of the possible scenarios for the procedure (based on Wierzchoń et al 2014) runs as follows: after a fixation cross is flashed up on a laptop monitor, a target stimulus is presented to the participant over near-threshold time durations (e.g. between 16 and 192ms), followed by a 200ms presentation of a mask. The target stimulus may be either quite simple (e.g. geometrical shapes, numbers, letters) or a more complex image (e.g. male or female faces), while the mask will be an unspecified image (e.g. various meaningless patterns). Immediately after the presentation of the stimulus and the mask, the participant is asked to identify the object (e.g. as male or female) and, after that, to rate the quality of his or her visual experience (e.g. using a scale structured into four consecutive

grades: *clear experience*, *almost clear experience*, *vague experience*, and *no experience*). In most cases, reports are given by pressing the relevant buttons on the laptop keyboard: for example, in the context of the identification task, pressing 'right arrow' may correspond to 'female face' and 'left arrow' to 'male face', whilst when it comes to quality-related ratings pressing number '1' may correspond to 'clear experience', '2' to 'almost clear', and so on.

Turning to the CR procedure, we may note that this can be performed under an identical scenario to that for PAS as described above (Wierzchoń et al. 2014, just cited). However, the most important difference is that after completing an identification task, a participant is asked to rate their confidence in their own (identification-related) performance by choosing confidence levels (on a scale running between total guessing and actually knowing (outlined in Wierzchoń et al 2014) in four consecutive steps, these being *guessing*, *not confident*, *quite confident*, and *very confident*). Although CRs are based on one's judgement of one's own performance, and aim to avoid explicit introspection, they may implicitly involve a relation to the quality of one's own experience.

Meanwhile, PDW has, in turn, a lot in common with the procedure for CR, the major difference being that, after completion of the identification task, instead of deciding about confidence the participant is asked to wager on how they will eventually assess their own performance with a specified amount of money (e.g. by opting for a 20, 40, 60 or 80 PLN stake). The initial aim of the procedure was to encourage participants – by appealing to their desire to gamble and maximize earnings – to give answers in cases where confidence was too low, and consequently to increase the sensitivity and exhaustiveness of

the measure (especially for near-conscious perceptions). However, the results here have proved to be of debatable validity (due to the influence of the phenomenon of *risk aversion*). Most importantly, for the purposes of this article, the initial claim that PDW is a direct and yet also an objective measure of awareness has been subjected to powerful criticism (Seth 2008a, 2008b).

Currently, the most commonly encountered examples of so called *objective measures* are furnished by different kinds of *forced-choice discrimination* or *identification tasks*. Again, the procedure may be performed under an identical scenario to that of the aforementioned cases: coming after the fixation cross, a given target stimulus is presented to a participant over some near-threshold duration, followed by a mask and a forced-choice identification task (e.g. choosing between alternative options: male or female). Based on the objective number of correct and incorrect identifications, the measure may be calibrated to boundary conditions (e.g. via varied presentation times), such that performance is just above the level of chance. (Such boundaries with respect to objective sensitivity determine the parameter known as *d'*, as defined in *Signal Detection Theory*, a theoretical foundation for objective measures (Macmillan and Creelman 1991; Phillips 2016).) The original assumption behind objective measures of awareness is the so called 'Worldly Discrimination Theory' (Gaillard et al. 2006; Fu et al. 2008), according to which, if a person is able to discriminate between two stimuli (presented within sensitivity thresholds), they are aware of those stimuli. So the objective approach implies that sensitivity to certain stimuli (as shown in the relevant behavior) correlates with awareness of those stimuli (or even may involve the very same process), which is quite debatable.

(These issues have been described more extensively elsewhere (see Timmermans and Cleeremans 2015).)

It is worth noting that subjective and objective procedures currently coexist fruitfully in practice, as they make inspecting and correlating their results straightforward. Most often, the above-chance (objective) sensitivity obtained in the discrimination task (in the form of a sufficient number of correct identifications) is compared to some different subjective measures. Meanwhile, the most interesting cases are those that show a dissociation between subjective and objective measures: the so called *guessing criterion*, where a participant reports 'guessing' or 'no experience' even while exhibiting a high level of accuracy in respect of the relevant discrimination task (potentially implying access to certain unconscious yet relevant information), and the *zero-correlation criterion*, where confidence or awareness ratings do not relate to accuracy (potentially implying exposure to certain conscious yet non-relevant or biased information) (Dienes et al. 1995; Dienes 2008). A similar idea of applying signal-detection theory to subjective awareness ratings is explored in the so called *meta-d'* approach. (Just very roughly, as d' is obtained by quantifying correct and incorrect discriminations, the meta-d' parameter is obtained by quantifying correct and incorrect discriminations of one's own correctness or incorrectness (see Maniscalco and Lau 2012, 2014).

2.2 Behavioral and Phenomenological Objections

With reference to subjective measures, Persuh (2018) has claimed in a recent article that "… [the] "subjective" character of [such] measures is illusory and … subjective measures, like objective measures, estimate only performance on a discrimination task." He relates this declaration explicitly to introspective report procedures, such as PAS, and also argues that "[n]o matter how the question is posed [for the hypothetical participant, John – author's note], language does not give John any special powers to make his report more subjective." Persuh justifies this from the perspective of a very broadly specified behavioral assumption to the effect that there is no relationship between someone's report about their own experience and their actual experience other than certain behavioral correlations, because "an organism can only report correlations and we can only measure task performance" and, "[b]y the same token, a parrot can learn a correlation between its visual experience and some arbitrary motor output."

If Persuh's position on this amounts to a 'behavioral stance', then we might easily move in the opposite direction and argue, from what might be said to be a 'phenomenological stance', that in the case of *objective measures* their objective character is illusory, because objective measures, like subjective ones, estimate only with reference to a (subjective) response criterion – and, moreover, that no matter how the question is posed, the language employed does not itself have any special power to make the answer more objective. In fact, such considerations have already been highlighted by several researchers, who have pointed out that even in the context of forced-choice decisions or identification tasks, a participant must to a certain extent use their own *response criteria* in

order to make up their mind and arrive at an answer (Timmermans and Cleeremans 2015; Phillips 2016). The nature of such a decision process – whether it amounts to an unconscious or pre-conscious gathering of evidence or build-up in confidence – remains a matter for investigation.

Both behavioral and phenomenological objections to the subjective *versus* objective distinction as it figured in the context just outlined are, in this author's view, misleading. Indeed, it will be argued below that they rest on a misunderstanding of the very foundations of what that distinction amounts to. Yet, at the same time, it must be admitted that such a line of argumentation points in the direction of some things that hold true for the measures in question. First, it indicates that both subjective and objective measures are in fact behavioral, because they actually measure (directly) specific behaviors (e.g. button-pressing on a laptop keyboard, or verbal activity), and second, it reveals that both measuring procedures do actually require decisions on the part of participants, these being based on their processing/perception of stimuli presented during the experiment. These simple facts not only make the above objections potentially plausible, but also make the measures vulnerable to other well-known problems. The latter are exemplified in such questions as whether the behavior measured actually correlates with *any* form of consciousness, and whether, if so, it correlates *only* with consciousness (and not, for example, with certain unconsciously learned response strategies), as well as whether the (subjective) response criteria are free of bias – or, at least, less susceptible to being biased, and so on (Phillips 2016). In general, questions about the validity, exhaustiveness, and exclusiveness of the measures in question (Timmermans and Cleeremans 2015) are very

hard to answer unambiguously, and quite apart from all the methodological issues involved, this will anyway be the case for a comparatively more fundamental reason: namely, that the very notion of consciousness is itself far from unambiguous. (The science of consciousness has not fixed any definite threshold or thresholds, and neither has it managed to construct any conception or theory of consciousness that has gained universal acceptance; thus, we remain uncertain as to which states should be counted as conscious and which as unconscious or less conscious. Ultimately, then, all one can do is seek to relate the above questions to some sort of operational definition of consciousness (cf. Jonkisz 2012, 2015).)

2.3 The Methodological Distinction

The present author's position is that both of the above lines of argumentation (i.e. the behavioral and phenomenological objections) misconstrue the distinction between subjective and objective measures, and that they do so by overestimating both the character of the task involved in the procedure and the language used by participants there. It is not the difference in the tasks involved – between ratings of experience on the one hand and delivering discriminative answers based on sensory content on the other – that is key to that distinction. Moreover, it is also not the difference in the language used when describing qualitative features of experience on the one hand and objective features of the stimulus on the other. (Regarding linguistic influences on such measures, see also the work

of Lyyra (2019).) At the same time, what we may note is that the (subjective/objective) character of the criterion used as an experimental threshold for consciousness is being underestimated or even totally neglected here, whereas it will be argued below that this should in fact count as crucial where this distinction is concerned.

The subjectivity of putatively *subjective measures* is unequivocally justified by the very criteria according to which some given behavior (e.g. reporting on the quality of one's own experience or on one's own performance via button-pressing) is correlated with conscious or unconscious stimulus-processing (in the case of a binary measure), or with certain intermediate grades of consciousness (in the case of graded and continuous measuring scales). The criteria are subjective simply because all that counts here is the participant's biased decision about whether their visual experience has been clear, almost clear, vague or nil (in the PAS procedure), as revealed in the corresponding behavior. (The same goes for subjective performance judgements within the CR and PDW procedures, where subjectively biased decisions about confidence or wager stake are all that counts).

Similarly, the criteria employed in what are claimed to be *objective measures* qualify as objective inasmuch as what counts there is just sheer performance or accuracy in respect of some discriminatory task: i.e. the (objective) proportion of valid discernments to false alarms. Of course, the objection coming out of the 'phenomenological stance' (described above) might be that in this case even sheer performance is based on a subjectively-biased response criterion (formed with reference to the perception of the stimulus by some participant/subject or other). The answer to this, though, is straightforward: one grants that that is true, but in objective measures both the sensitivity

levels (with d'>0) and the personal (biased) response criteria (with criterion C) are controlled (in that no matter what the response criteria happen to be, the performance should anyway be above the level of chance). Therefore, what the objective procedure considers when deciding whether or not the perception of the stimulus was conscious is whether or not a participant was sensitive to the stimulus and whether or not he or she performed accurately.

Just as in the case of objective measures the *phenomenological objection* can be refuted, so in the case of subjective measures the *behavioral objection* can be so. According to the latter, the subjective character of subjective measures is illusory, as (like objective measures) they only estimate performance in certain discriminatory or forced-choice tasks presented in behavior. The answer, once again, is quite simple: one grants this, but the behavior presented in subjective measures (such as PAS, CR or PDW) is based on personal, biased criteria (e.g. a choice between 'clear experience' and 'no experience,' or between 'guessing' and 'confident'), which are not controlled. Therefore, it may also be said that whereas in subjective measures a *subjective threshold* is being utilized, in objective measures it is an *objective threshold* (see Timmermans and Cleeremans 2015). The thresholds in question were already defined by Cheesman and Merkile (1984), when they wrote that "[a] subjective threshold may be defined as the detection level at which subjects claim not to be able to discriminate perceptual information at better than a chance level, whereas an objective threshold is the detection level at which perceptual information is actually discriminated at a chance level."

Consequently, what makes some measure subjective or objective is not the specific task, with some special form of reporting or language-use being involved alongside this (as the above lines of argumentations seem to suppose). Rather, it is the criterion or threshold according to which some given behavior is correlated with conscious, almost conscious, barely conscious or unconscious stimulus processing (depending on the procedure used). The subjectivity or objectivity of the criterion, or the threshold for consciousness implemented, cannot be questioned in the ways outlined above, and so may serve as an unambiguous characterization of the measures in question. Thus:

- Measures will be objective when they utilize an objective threshold (a bias-free criterion for consciousness).
- Measures will be subjective when they utilize a subjective threshold (a biased criterion for consciousness).

Surprisingly, such a methodological or pragmatic formulation of the distinction is not commonly encountered in the current debate – a fact which is no doubt bound up with the existence of other more frequently adopted ones (see below).

2.4 The Semantic Distinction

Another way of defining the distinction between subjective and objective measures goes in the direction of differentiating between so called 'outer states' (stimulus features, worldly

discriminations, etc.) and 'inner states' (mental, experiential, perceptual). Here are a few examples:

> An objective measure uses the ability of a person to discriminate states of the world… Subjective measures ask people to report the mental state they are in… (Dienes 2008)

> Subjective measures leverage introspective capabilities….. Objective measures do not require introspection and instead use some other behavior, for example forced-choice decision accuracy… (Seth 2008b)

> Objective methods typically involve asking people to choose between different carefully constructed alternatives (i.e. as in a two-alternative forced-choice task) rather than describing what they saw or felt [i.e. what subjective methods do – author's note]. (Timmermans and Cleeremans 2015)

In principle, such characterizations specify what the report required or requested in connection with some task outlined in relation to a given measure refers to (i.e. whether it should be directed towards inner or outer states). Hence, the distinction, when constructed along such lines, may be said to possess a semantic character, taking the following form:

- Measures are objective when they ask one to discriminate (and report) states of the world (e.g. features of the stimulus presented).
- Measures are subjective when they ask participants to introspect (and report) their perceptual states (e.g. experiential features).

Intuitively, the distinction seems fine. However, for at least two reasons, it is not as efficacious as the methodological one presented earlier. First, this is because it is very difficult to be sure about whether a participant is introspectively reporting inner states or, instead, discriminating outer states without introspection: we cannot even be certain whether these two processes are going on in ways that are separate or intermixed. (In this context, see also the so-called *transparency thesis*, according to which isolated awareness of features of one's own experience is virtually impossible (e.g. Tye 2014).) Admittedly, it has recently been proposed that the semantics of the *perceptual-awareness scale* should be examined, and that only 'experiential terms' such as clarity or intensity should figure in the task description (Lyyra 2019). However, even with such a refined PAS, doubts may well remain as to whether taking due care over the semantics will suffice to ensure adequate receptivity to the participant's phenomenology. Second, it is because when all subjective measures are taken into account, such a definition better fits the procedures involved when using a *perceptual-awareness scale*, while being problematic in relation to both *confidence ratings* and *post-decision wagering*. By asking people to judge their own performance, either in terms of their own confidence in the latter or via their willingness to wager on it, such measures explicitly ask for neither the stimulus features nor the inner perceptual states to be reported – yet, implicitly, both are most likely involved. (Even so, opinions are divided on this: see, e.g., Seth (2008a, 2008b), who includes PDW in objective measures, and Timmermans and Cleeremans (2015), who treat both measures as subjective). In fact, both CR and PDW may implicitly involve *metacognitive judgements* about both the identification process and one's own performance within it. (See also the next part of this

article, below.) In the present context, it would be more accurate to refer to them as *subjective performance measures*, and to PAS and similar procedures as *subjective experience measures*.

There is also a more fundamental reason for the semantic distinction's being problematic. Whereas the criterion or threshold applied in the context of a given measure can be unambiguously identified as subjective or objective (as shown in the previous section), the task's reference to inner or outer states can in both cases be interpreted in either direction. That is because the features of the presented stimulus alone can be both objective (e.g. location and shape of the object, its category or name) and, at least partly, subjective (e.g. color, appearance in the sense of *seeming* a certain way) – something that of course pertains to the classical (Lockean) distinction between *primary* and *secondary qualities*. Similarly, features of inner perceptual states can also be analyzed from both an objective and a subjective angle: the referential (or intentional) object of a given perceptual state (e.g. a human face or a certain geometrical shape flashed up on a screen) is more or less objective, whereas the qualitative features of perceptions are subjective (e.g. intensity or clarity of the image involved). Such comments must suffice here, as a fuller analysis of this issue would require one to delve into different philosophical theories of perception – something not essential to the aims of this text.

3. Directness as a Feature of Awareness Measures

Some researchers claim that conscious experience lends itself to being gauged directly via a specifically designed measure (see Persaud et al. 2007), whilst others prefer to assert that a certain measure is just more direct than others – for example, that PAS will measure consciousness more directly than other subjective measures (Sandberg et al. 2010). At the same time, there are researchers who insist that due to the ontologically subjective nature of conscious experience, all measures of consciousness must be indirect (e.g. Seth 2008a, 2008b; Timmermans and Cleeremans 2015). Taking these discrepancies seriously, it seems reasonable to inquire into what it is that makes a given measure of consciousness direct, or at least more or less direct.

The issue does not seem as straightforward as the distinction between subjective and objective measures. Nevertheless, just as subjective measures, compared to objective ones, are quite often considered 'better' (at least in terms of their validity; see Timmermans and Cleeremans 2015), so also direct measures emerge as preferable to indirect ones (see, e.g., Persaud et al. 2007, or Sandberg et al. 2010). The definition of 'direct' and 'indirect' measures was actually formulated by Reingold and Merikle (1988) with the aim of targeting unconscious perception using objective measures of performance. However, their definition (analyzed separately below) does not automatically apply to subjective measures, and also does not seem to be 'directly' employed in the current discussion. As will be shown, directness of measures is currently only construed rather ambiguously, with multiple senses and divergent philosophical assumptions.

This next part of this article will start out with a brief analysis of some metaphysical assumptions about consciousness that have arisen either explicitly or implicitly in the literature. This will then be followed by an exploration of Reingold and Merikle's definition of 'direct measure', and an analysis of some other possible senses in which the term 'directness' may be construed.

3.1 Metaphysical Directness

The subjective character of conscious experience, in the sense of its privacy or first-person-based accessibility, is undeniable; moreover, it is commonly held to be the aspect that differentiates consciousness from other phenomena known to science. As a basis for such theoretical concepts as *phenomenal consciousness* (Block 1995) and the *hard problem* of consciousness (Chalmers 1995, 1996), the subjectivity of experience has ultimately pushed many contemporary philosophers of mind in the direction of endorsing some otherwise quite unpopular theoretical and/or metaphysical outcomes, such as *dualism* or *panpsychism*, often combined with *antireductionism* or *mysterianism* (Block 1995; Jackson 1982; Chalmers 1995, 1996; Searle 2000; McGinn 1989). It seems that the issue also arises in discussions about the directness of awareness measures, where some prominent scientists are inclined to follow Searle's declaration regarding the *subjective ontology* of consciousness:

> Because conscious content is ontologically subjective, it is a simple fact of the matter that no such direct behavioral measures exist… (Seth 2008a)

> It would be pushing at an open door to state that the study of consciousness is challenging because it attempts to develop an epistemically objective approach to a phenomenon that is ontologically subjective… (Timmermans and Cleeremans 2015)

If, as Seth claims, behavioral measures cannot be direct because the contents of consciousness are ontologically subjective, what kind of directness is being invoked here? He is quite scrupulous on this point, and states that a "'direct measure' is one that transparently reflects its target property, as a ruler directly measures length" (Seth 2008b). If this is supposed to mean that a direct measure of consciousness would measure consciousness as if the subjectivity barrier had disappeared, with full access to conscious contents 'from the outside' as if 'from the inside', then it has to be admitted that such an idealized scenario is of course impossible, and Seth is right. Yet such a barrier-crossing, metaphysical understanding of directness may be also accused of fallaciousness. Such an accusation would be very similar to those levelled against the majority of idealistic advocates of the so called *knowledge argument* (formulated in many versions by, e.g., Broad, Feigl, Nagel and Jackson) or *explanatory gap* postulate (coined by Levine), insisting that science should provide direct knowledge of other subjects' experiences. The belief that science has only resolved the hard problem of consciousness when it permits us to know (directly) what it is like to see in color, or 'what it is like to be a bat' (or any other being different from ourselves), is fallacious when construed literally, in that it involves, at

the very least, a *category error*: scientific (objective) explanations *just are* categorically different from (subjective) conscious experiences (Pigliucci 2013; Jonkisz 2016). And if indeed such a formulation of the hard problem "does not require a solution, but rather, a cure" (Edelman et al. 2011, p. 5), then the same goes for metaphysically construed directness. Measures *just are* located in a different category from conscious contents, so claiming that "the fact that consciousness is ontologically subjective precludes direct behavioral access to conscious content" (Seth 2008b) is either tautological or (indirectly) fallacious. In this context, one may even reasonably ask whether there is anything at all arising within psychology or the philosophy of mind that could be directly measured in behavior.

As an aside, it is perhaps worth adding that when it comes to discussing measures of consciousness, a more conservative approach to the entertaining of metaphysical assumptions about consciousness would seem to be the safer option. Claims about the subjective ontology of consciousness, adopted from Searle (2000) and other philosophers, are very strong, and straightforwardly entail all the difficult metaphysical consequences mentioned above, which may turn out to be needlessly problematic. Trying (once again) not to delve into wider philosophical discussions any more than is absolutely necessary, it may hopefully suffice just to point out that to justify the thesis of the privacy of experience one is not obliged to endorse a *subjective ontology* of consciousness, as a weaker position positing only a *subjective epistemology* will be sufficient for this – while still enabling one to avoid those perplexing consequences (Northoff and Musholt 2006). According to epistemological subjectivism, the contents of consciousness are accessible or cognizable

only from the first-person-based point of view (i.e. only as experienced). This position does not automatically entail consciousness's existing only as experienced (see Northoff and Musholt 2006). It therefore enables one to furnish a justificatory basis for explaining the mechanisms of consciousness – or even for their reduction to neurophysiology. Such a position also fits well with the multidimensional character of consciousness recently emphasized by some researchers (Bayne et al. 2016; Jonkisz et al. 2017), as a multidimensional consciousness may be both epistemologically subjective (in respect of content accessible from a first-person-based standpoint) and ontologically objective (in that it exists as a complex biological phenomenon). Moreover, epistemological subjectivity may itself be naturalized – in terms that make reference to individuating differences. (For the hypothesis of *biological individuation*, see Jonkisz (2015, 2016).)

3.2 Methodological directness

One specific sense for the notion of directness we are concerned with is defined in Reingold and Merikle (1988), an article that targets unconscious perception using discrimination tasks with objective performance thresholds. In that approach, *direct measures* are those that explicitly define a discriminative answer in the task description (e.g. a word, a letter, a color), whereas *indirect measures* measure the effect on some given discrimination that a certain perceiving of information not defined explicitly in the task, but nevertheless implicitly present, has. As in their example (familiar from the Stroop experiments), when presentations of color-word stimuli are followed by descriptions (e.g.

asking “Which word have you seen?”), the performances in such a task “constitute a direct measure of word perception,” while when the task is formulated in converse fashion by asking “What color have you seen?” it is judged that “any effect that the words may have on color-naming performance would constitute an indirect measure of word perception” (Reingold and Merikle 1988, 564). The authors stress that they are abstracting from any implications about the sort of underlying process that might influence performance (e.g. whether it is *priming* or *subliminal* perception). At the same time, they assume that under normal conditions direct measures should result in higher or equal performance rates (in respect of sensitivity) compared to indirect measures, whilst arguing that in other cases one may justifiably posit some sort of influence of unconscious processes on participants’ performance. As one can clearly see, directness defined in these, methodological terms is straightforwardly applicable to objective measures of performance. Hence, instances of the procedure should probably be referred to as *direct performance measures* rather than *direct awareness measures* – the more so as the relationship between performance and awareness is itself a matter of debate, as indeed is the validity of such measures (Timmermans and Cleeremans 2015).

At the same time, a characterization of directness of this sort, as formulated by Reingold and Merikle, represents the only unambiguous sense attached to the term. As was already mentioned, this definition has not been explicitly applied within the current discussion concerning subjective measures, though it would be interesting to analyze the latter in the light of methodological directness. This may be done only very briefly here, as a preliminary step towards a proper investigation.

In the case of *subjective experience measures* such as PAS, what is explicitly defined in the task is the *quality* of (previous) stimulus experience (which has to be assessed). To be more literal in the application of the definition, if the task captured by the question "Which word have you seen?" constituted a direct measure of 'word perception' (as in the original scenario from Reingold and Merikle's example), then the task captured by the question "What was the quality of your experience?" would constitute a direct measure of 'quality perception.' (In the PAS scenario analyzed here, it was 'clarity' that was in fact explicitly defined in the task as a qualitative feature of experience.) In this sense, *subjective performance measures,* such as CR and PDW, will measure experience quality only indirectly, since they do not to involve any experiential features being defined in the tasks (neither clarity, nor intensity or energy, etc.), being oriented instead towards the assessment of one's own performance (by means of confidence or wagering). Consequently, it may be said that out of all of the subjective measures analyzed here only PAS represents a methodologically direct measure of certain qualitative features of experience (such as clarity).

3.3 Semantic directness, and other senses of the term

It is fairly common to see proposed the idea that so called 'worldly discriminations' correlate with lower-order contents than do reports of one's own perceptual experiences; the former are therefore also called *first-order* states, the latter *second-*, *higher-order* or

metacognitive ones. (Other terms relevant to this distinction are, for instance, *primary* vs. *secondary consciousness*, and *sensory consciousness* vs. *introspective consciousness* (Seth 2008a, Seth et al. 2005; Edelman 2003).) Such a hierarchy is sometimes expanded to encompass three, four, or even five consecutive orders (Jonkisz 2012; Morin 2006). With the aim in mind of seeking to analyze measures of consciousness, the following three orders of visual awareness will be discussed here:

- Awareness of the stimulus (*object experience*) – enabling one to discriminate different features pertaining to the perception of the stimulus (e.g. its location, shape, color or category);
- Awareness of seeing (*seeing experience*) – enabling one to discriminate different features of a visual experience (e.g. its clarity, intensity);
- Awareness of (one's) visual experiencing (*experience of oneself as a seer*) – enabling one to judge one's own visual experience (e.g. in terms of object-identification performance).

The process is likely to be a great deal more complex, in fact, as even first-order awareness (*object experience*) may be split into awareness of some lower-level features pertaining to the stimulus (such as shape, location, hue, or color) and awareness of higher-level features (like the identity of the object, or its semantic category). (In this context, see the *level-of-processing* hypothesis (Windey et al. 2013; Anzulewicz et al. 2015; Jimenez et al. 2020).) Moreover, taking the neurophysiology of visual perception as a basis, even the lower level features listed here may be ordered, since it is well known that information about shape and location is processed earlier than information about color (see Lamme et

al. 2000), as well as the various articles collected in Spillman and Werner 2012). Even so, the nature of the three coarse-grained orders described above is semantic rather than physiological. This is because the hierarchy reflects a referential ordering in which higher orders assume lower orders (in the sense of being *about* them; see Jonkisz et al. 2017, and Jonkisz 2012): without first-order sensory content (stimulus experience), it is impossible to perform a second-order assessment of, say, clarity of visual experience, and without any (second-order) awareness of the experience of seeing (e.g. its degree of clarity), it is practically impossible to be aware of one's being engaged in visual perception oneself and, for example, assess one's own discriminative performance. (In this context, see also Seth 2008a.)

Why might such orders of consciousness be relevant when analyzing possible senses in which measures could be said to be 'direct'? When a participant reports no signs at all of higher-order awareness (e.g. 'vague experience' or 'no experience' in PAS, or 'guessing' in CR), this is still not enough to declare a total absence of any sensorily experienced content. (As the suggestive dictum goes, "absence of evidence is not evidence of absence" (Seth 2008a; Timmermans and Cleeremans 2015).) Higher orders assume lower orders, but not *vice versa*. The lowest orders will therefore be in some sense basic or primary, and it may be hypothesized on this basis that:

- A measure may be considered semantically more direct (than another) when it targets a lower-order awareness.

If that is the case, then the most semantically direct measures will be those that target one's first-order awareness of the stimulus. Objective performance measures are the most obvious examples here, the original assumption behind such measures (i.e. so called 'World Discrimination Theory' (Gaillard et al. 2006; Fu et al. 2008)) being that awareness of the stimulus correlates with behavioral sensitivity to the latter, disclosed in the form of an ability to discriminate its features with statistically significant accuracy. Meanwhile, *Perceptual-Awareness Scale* (PAS), despite its subjective threshold, also directly measures behavior (e.g. pressing the relevant buttons on a laptop keyboard). However, because a participant in a PAS experiment is asked to rate their own (first-order) visual experience (e.g. as *clear*, *almost clear*, *vague*, or *nil*), they have at the very least to be aware of seeing, so that the behavior correlates here with (at least) a second-order awareness of seeing. Although PAS does not seem to be semantically the most direct measure in this scenario, it is still likely to be more direct than other subjective measures. (At least, that was the initial claim put forward (Sandberg et al 2010).)

According to the most common procedure applied in *Confidence Ratings* (CR) and *Post-Decision Wagering* (PDW), participants have to assess their own performance in some prior identification task by determining a degree of confidence, or an amount of money in a wager, on a structured scale (binary, four-fold or continuous), with their decision ultimately then being revealed in the corresponding behavior. (Behavioral responses may share an identical scenario across all subjective measures (Wierzchoń et al. 2014).) It seems that judgements about one's own performance require, even if only implicitly, at least a rudimentary consciousness of oneself as visually experiencing

something with a certain quality (i.e. clearly or not clearly enough). Hence, the task requirements of the CR and PDW procedures seem to result in highly metacognitive processes (Seth 2008a, 2008b) and require the most abstract orders-of-reference (Jonkisz et al. 2017). Ultimately, contra Persuad et al. (2007), such measures will be the least direct of all those appearing in the scenario.

On the other hand, as some researchers have pointed out, to the extent that introspection is not explicitly called for in CR or PDW, one's own performance judgements might then be based on more intuitive knowledge or instances of so called 'gut feeling' (see Timmermans and Cleeremans 2015, p. 34). If that were so, then *subjective performance measures* could in fact require lower-level contents – and possibly even ones lower than PAS (as originally claimed by Persuad et al. (2007) and more recently by Lyyra (2019)). Consequently, it can be said that in principle CR and PDW may be considered – and probably also designed as – semantically more or less direct. They will be more direct when participants judge their choices using 'intuition' or 'gut feeling' – with metacognitive judgements being in this case inhibited somehow (e.g. by limiting decision-times). And they will be less direct when participants are allowed, or even encouraged, to scrutinize their visual experience more carefully – with 'intuitive judgements' having somehow to be inhibited here (e.g. by removing limitations on decision times and/or asking that answers be subsequently confirmed). Hence, just as *objective performance measures* may be designed to be direct or indirect (see above, and also Reingold and Merikle (1988)), *subjective performance measures* (CR and PDW) may also be carried out in ways that will make them more or less so, at least in the semantic sense of 'directness'.

Are there any other senses in which talk of the 'directness' of such measures merits our interest here? One interesting possibility has been pointed out by an anonymous reviewer of this very article. It concerns the idea of 'causal directness'. Intuitively, a measure of awareness will be causally direct if there is no intervening cause between the presence of consciousness and the behavior recorded. Consequently, measures with less intervening causes would count as causally more direct, and these are construable as measures with fewer and/or stronger causal connections obtaining between the presence of consciousness and the recorded behavior. The issue certainly calls for more careful investigation, but we can sketch out a few brief thoughts even at this stage. It may be said, to begin with, that all sorts of objective methods seem more direct in this sense, if only because the time interval between actual experience and related/measured behavior may well be shorter here (with basic sensory detections or discriminations occurring much more rapidly than metacognition). At the same time, in relation to other senses of 'directness', one can reasonably claim that semantically more direct measures also seem more causally direct (e.g. in the sense that measures of sensory content are more direct, both semantically and causally, than measures of higher-order and metacognitive contents), while methodologically indirect measures (e.g. priming methods) appear causally more direct than methodologically direct discriminations. It also seems that no measure could be absolutely causally direct, as this would represent a similarly idealized scenario to that of metaphysical directness. It would also appear to be the case that the idea of causal directness in some sense overlaps with that of metaphysical directness; however, this issue,

as well as other possible senses of 'directness', will need to be further investigated elsewhere.

4. Conclusions

In the case of the distinction between subjective and objective measures, it has been shown that only its methodological version, based on criteria or thresholds for consciousness utilized in a given procedure, rules out both of the objections (i.e. the behavioral and phenomenological ones) outlined in the present article while also enabling one to distinguish between the measures unambiguously. However, it was argued that this is not the case for the semantic version, which distinguishes measures by their reference either to features of the stimuli presented (worldly discriminations) or to the participant's introspective or inner states (experiential features). It was also demonstrated that such a formulation of the distinction raises at least three additional problems. The first difficulty was that it is virtually impossible to scrutinize introspection in a way that allows one to separate out experiential features from features of the stimulus itself. A second problem was that the distinction does not work properly in relation to either *Confidence Ratings* or *Post-Decision Wagering*, as they are explicit about not asking one to report either stimulus features or inner perceptual states. Meanwhile, the third issue concerned perception in general, in that whether a given measure directs the participant's attention outwards or inwards fails to capture what is at stake; this is because subjective and objective aspects

may, in fact, be involved in both sensory content (accessing features of the stimulus) and introspective or metacognitive content.

Where the directness of these measures of awareness is concerned, the present article has shown that the philosophical assumptions of an ontological nature implicated in how this feature is sometimes understood needlessly entail certain troublesome metaphysical consequences. (A more conservative approach is therefore to be recommended in this matter – one in which subjectivity is interpreted epistemologically rather than ontologically). It has also been concluded that behavioral measures (obviously) cannot be *metaphysically direct*, since such a presumption would be fallacious (i.e. based on a category error). The present article has also explored the only unambiguous characterization of directness not yet 'directly' invoked in the current discussion. On this view, measures were considered direct when they explicitly specified a discriminative answer in the task description itself – otherwise they were considered indirect. Originally, this sort of *methodological directness* was applied to objective performance measures, but in this article a preliminary attempt at interpreting subjective measures in the light of this definition has also been undertaken. It was argued that only PAS represents a methodologically direct measure of experience quality (as it explicitly defines qualitative features of experience, such as clarity, in its delineation of its task), while both CR and PDW will only measure experience quality indirectly in this narrow sense (since they are directly oriented towards the assessment of one's own performance). The article also sought to define (graded) *semantic directness*, according to which a given measure is considered semantically more direct if it targets a lower-order form of awareness. In the

latter sense, the most direct measures will be those that target first-order awareness of the stimulus: i.e. *objective performance measures*. PAS and other *subjective experience measures* will count as second- or higher-order awareness measures, whereas *subjective performance measures* (CR and PDW) will be regarded as third-order or metacognitive awareness measures (and hence as being the least direct of them all). Nevertheless, it was also pointed out that *subjective performance measures* could be considered more direct if, in the context of experimental procedures, metacognitive judgements were somehow to be inhibited to encourage more intuitive responses. In addition, the idea of *causal directness* was introduced – albeit also only in a preliminary form – where causally more direct measures are those with fewer and/or stronger connections between experience and recorded behavior. It was argued that objective measures seem causally more direct than subjective ones (if only because basic discriminations need shorter time intervals to affect behavior). Meanwhile, it also appears to be the case that the more a given measure is semantically direct, the more it is causally direct (for the same reason pertaining to time intervals) – though methodologically indirect priming shows up as causally more direct than forced-choice discriminations. Last but not least, as we have clearly seen, both semantic and causal directness are graded in character.

We are now in a position to furnish more specific and justified answers to the target questions pursued here pertaining to *subjectivity* and *directness* as these relate to some given behavioral measure of awareness – namely, what makes a given measure subjective, and what makes it direct?

Where the former is concerned, it may be said that only a biased criterion for consciousness (subjective threshold) is what makes a behavioral measure unambiguously subjective (a bias-free criterion/objective threshold will automatically make a measure objective). In this sense, PAS, CR and PDW are equally subjective (despite the fact that participants directly assess their own perceptual experience only in PAS, whereas in CR and PDW they assess their own performances in respect of perceptual discrimination). It is worth adding here that the so called "meta-d' procedures," or certain versions of the 2-interval forced-choice (2IFC) method developed recently by Maniscalco and Lau (2012, 2014) and Peters and Lau (2015), aim at taking advantage of both subjective and objective measures (by trying to control subjective threshold biases with signal detection tools). The direction seems legitimate, yet the results and status of these methods remains a matter for further investigation (e.g. whether controlling the sensitivity of higher-order judgements about performance is enough to render a measure objective, or it is still, perhaps, a subjective measure of awareness, but an objective measure of metacognition). Anyway, the main conclusion is that the distinction between subjective and objective measures is unambiguous only when based on a methodological criterion.

In the case of the latter (i.e. directness), this turns out to be quite ambiguous, with metaphysical, methodological, semantic and causal interpretations of the concept potentially in play. It was argued that behavioral measures cannot be metaphysically direct, and that such a conclusion is either tautological or based on a category error of sorts. Objective performance measures, on the other hand, can be methodologically direct (when the task explicitly specifies the discriminative answer in its description), but their validity

in measuring awareness is questionable. Meanwhile, subjective experience measures (such as PAS) may also be construed as methodologically direct, but what is being measured directly in this case is quality perception in respect of (previous) experiences (defined in terms of clarity or other experiential features). Behavioral measures may also be considered semantically more direct when they target lower-order forms of awareness. In the latter, graded sense of directness, objective performance measures will be the most direct, subjective experience measures (such as PAS) less direct, and subjective performance measures (such as CR and PDW) the least direct. The final sense of 'directedness' introduced here concerned its causal interpretation, where causally more direct measures were characterized as being those with fewer and/or stronger connections obtaining between experience and recorded behavior.

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