KELLY ROE (AUDITING): ASSIGNMENT TWO

How would you describe the biological purpose of sensory perceptions?

One intuition that we have about sensory perception is known as the 'transparency of experience'[1]. The intuition is that our perceptual experience tracks, co-varies with, or represents certain magnitudes or values of distal objective properties in the world[2]. If we consider the process of visual perception then the transparency of experience intuition starts to seem problematic, however.

We have objective magnitudes of distal objective properties such as reflectance, illumination, and transmittance (to name just a few). The value or magnitude of these properties results in a relatively proximal objective luminance magnitude which is the amount of light that reaches the retina. The luminance magnitude results in a sensory perceptual experience of brightness (where subjects can report on which of several percepts seems brightest).

The transparency of experience intuition is that perceived brightness tracks, co-varies with, or represents a magnitude of reflectance. A problem is that the magnitude of luminance (from which the brain arrives at a sensory experience) underdetermines the magnitude of the variables or properties that produced it[3]. For example, if we know that (for simplicity) the magnitudes of two properties contribute toward a magnitude of 10, then the magnitude of both of the properties that produced it is ambiguous. The magnitudes could be: 1,9 or 2,8, or 3,7, or 4,6 etc[4]. It seems hard to explain how the brain produces a determinate experience of brightness that is able to track the objective magnitude of reflectance on the basis of a magnitude of luminance when there are many values of reflectance that are consistent with the magnitude of luminance. Given this the question becomes: How is the transparency of experience possible?[5]

One way of attempting to answer this question would be to maintain that different distal magnitude complexes (e.g., 1,9 or 2,8 or 2,7 etc) occur at different relative frequencies in the world[6]. If this is so then it might be that the brain represents the distal

[1]In what follows I shall focus exclusively on visual perceptions even though it might well be the case that a similar story could be told for the percepts of other sensory modalities. I'll also only focus on one aspect of visual perception.

[2]I am concerned about my terminology and I'm not sure what the correct terminology is. The notion that I'm trying to convey is that there are different mind-independent properties (e.g., temperature) that have different magnitudes or values (e.g., 60 degrees or 70 degrees or 80 degrees etc).

[3]I'm unclear on whether the relationship between luminance magnitude and perceived brightness is one of correlation or whether there are problems with this link, too. I would guess that top down influences would also come to bear

[4]I suspect that I'm ignoring complicated issues to do with how the magnitudes of variables sum - or otherwise mathematically relate - for a luminance magnitude

[5]I'd be interested to know whether neurones have been found that are tuned to (at least some aspect of) reflectance and if so whether they are correlated with subjective reports of brightness / some critter pushing a lever or something to signify subjective reports of brightness if that is possible to train. I apologize if the answers to these are out there already... Or ill formed or something... I'm finding this material fairly dense and quite hard to get my head around in such a short space of time.

[6]Worrying about my terminology again, I hope the example helps make my intended meaning clear.

magnitude complex that most frequently results in the luminance magnitude. This answer seems to leave it as something of a mystery as to how the brain is able to detect the relative frequency of different distal magnitude complexes for a given luminance magnitude given that the luminance magnitude underdetermines the distal magnitude complex, however.

One attempt to explain the mystery is to maintain that instead of regarding sensory percepts to be end products of input mechanisms we should regard them to be the product of past input mechanisms and resulting behavioral responses that came to be selectively reinforced in virtue of the relative frequency of distal magnitude complexes. This would make sense of the intuition that perception must be useful to guide the action of the organism or such a costly system would never have evolved. If it is the case that an objective magnitude complex (1,9, for example) is more frequently the cause of the luminance value than other objective magnitude complexes; And it is the case that a kind of behavioral response has a good outcome for 1,9 but not for other values; And if it is the case that other kinds of behavioral response (that might have good outcomes for low frequency complexes) have bad outcomes when they are produced in response to 1,9; Then given the reinforcement history luminance values could come to be tightly coupled with behavioral responses that are adaptive responses to the most frequently encountered stimulus. This could result in the brain having a bias for a particular magnitude complex that is the most frequent cause of the luminance magnitude[7].

This account provides something of an explanation as to how it is possible that we track the magnitude complexes that are most frequently responsible for luminance values without leaving it as a mystery as to how the brain is able to track (or partly track) the objective frequency of different magnitude complexes that are responsible for the luminance values. It also provides something of an explanation as to why we might have this capacity - because this is a useful way of an organism guiding its action.

There are a number of assumptions that are required in this explanation, however. It is unclear to me just how plausible each of the assumptions are. One concern is how sensitive such models are to assumptions that are being made (e.g., assigning relative frequencies to distal magnitude complexes, assigning cost and benefit values to responses. It is also unclear to me what features of the world are adaptive for us to track (is that to be determined by tuning?), and that all sensory perceptual content is a product of what once was tightly coupled distal stimulus - behavioral response mechanisms. It is also unclear to me what the role of sensory percepts is (I think the sensory percept was equates with the subjective experience of brightness) and whether the conscious experience of brightness has much to do with action guidance at all (see Libet, for example, and the numerous examples that we have of our action being guided by unconscious visual perceptions that - I'm thinking - don't count as sensory percepts at all?).

[7]though if the cost-benefit analysis was different then things could get a little messed up e.g., if there was scope for a 'good enough' response to the 1,9 that could become coupled if the 'optimal' response to 1,9 were costly enough when emitted to the slightly less frequent 2,8. I'm not quite sure that this paragraph is very accurate... But I guess the intuitive idea is that natural selection often enough results in 'good enough but not perfect' type solutions especially when improvements are costly.