HIDDEN AGENDA:
A SCEPTICAL VIEW OF THE PRIVACY OF PERCEPTION

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Abstract

Intuitively ***perception*** seems to arise from a direct interaction with the environment, but we now realise that an internal loop intervenes. Its components are: physical messages from the environment acting on our sense organs, sensory messages from these organs, and the attempted reconstruction of the external world from these messages. This article argues that this scheme is incomplete because it does not show how perceptions are used. We must first add a stage in which a describable ***reconstruction*** of the external world is produced, then we must add the means of describing it to others. It is suggested that conscious perception corresponds to the use of this externally directed link either tentatively - we try out ***communication*** of the describable representation, but do not actually communicate it - or effectively when we do actually communicate it. Furthermore it is suggested that the ***survival value*** of perception results from the effective use of this link, so natural selection will not only ensure that it can be used effectively, but is also likely to have ensured that what we perceive is selected and moulded to provide optimum benefits to the social group to which we belong. Perception is not the ***private*** matter we tend to assume, but has this ***hidden agenda*** of serving our ***tribe***.

Introduction

A physiologist who puzzles over perception asks different questions from a psychologist or a philosopher. One is continually thinking about possible material realisations of perceptual processes in the brain, and the greatest help when

thinking of material mechanisms is to know what those mechanisms do, what they are used for: How do perceptions help us? How would we be worse off if we didn't have them? Are all representations of sensory experience equally good for the purposes we use our perceptions for? And so on.

As a result of thinking along these lines I have a rather different viewpoint from others presented at these meetings. First, it seems to me totally wrong to separate perception from ***learning***, not just because perception is modified by learning, even though this occurs; the more important reason is that the whole goal of sensory information processing up to the level of perception is to represent the world by the activity of elements suitable for the formation of new associations (Barlow 1994). If we did not perceive the world in terms of known objects in definite positions we would not generalise learned associations correctly, and we would not know where the things we had learned about were located, so that we would not be able to take the appropriate actions. I don't think we can begin to understand perception without appreciating that forming this representation is the ***goal** of early sensory information processing.

It is often not appreciated that the same body of information can be represented in totally different forms, and the form has a very large effect on what you can readily do with that information. For instance when a library is catalogued, author, publication date, subject matter, and size of the volume may or may not be used as cataloguing features and hence may or may not be deducible from the ***catalogue reference***. Even if the catalogues are complete in all cases and have unique references for each volume, the catalogue numbers would vary greatly in their usefulness; for instance if you wanted to know how often books above a certain size were withdrawn from the library it would be useful for the

size to be used in the catalogue reference, and likewise for questions about author, date of publication, or subject matter. These are just the sort of questions we need to know about the world around us: how often have I seen this before? Was there a happy outcome to my last encounter with it? What else did I see at the same time? The key point is that each item used in the representation, or in the book reference, should correspond to a meaningful and significant subset of all sensations, or all the books (Barlow 1995). We must catalogue our sensory experiences according to very definite principles if important questions about them are to be readily and accurately answerable, and I think the form of our perceptions is to a large extent dictated by these requirements. But I do not want to cover this ground again; as well as being things we need to learn about, I think the ***primitives** of our perceptual representation of the world are things we need to communicate about, and this is what I want to explain here.

I must make it clear that I am talking about conscious perception and not the vision that occurs in ***blindsight** (see Weiskranz 1997 for an up-to-date review) or in the system for controlling hand movements described by Milner (1997). These, and no doubt the visual systems of many animals, perform interesting and effective ***information processing**, and it is arguable that they deserve to be called perception because they share many features with the mechanism that produces the perceptions we experience in ordinary conscious vision. But it is consciously experienced perception that I shall consider here because it is pursuing the question "How do we use conscious perception" that has led to my different viewpoint.

Models of conscious perception

Let us consider alternative views of our conscious perceptual experience. Intuition says that they result from the

direct interaction of our perceptual apparatus with the outside world, and this is shown in the top box of figure 1; the double-headed arrow indicates the feeling we have that our eyes and fingers actively explore the world, and conscious experience results from this intimate interaction. This is of course far too simple and fails to incorporate what we have learned about the senses over the last three centuries and more, so the internal loop shown in the second box must be added. We are endowed with eyes, ears, senses of touch, taste and smell, and these are acted upon by physical stimuli from the world around us. Through the ***sensory messages*** thereby aroused we can, to some extent, reconstruct the physical events going on in the external physical world, and this ***reconstruction*** gives rise to our conscious perceptions. This is a crude sketch of the view presented by Marr (1982), and I accept most of it, but there are two problems: first the relation beween subjective experience and the world that gives rise to it is now much less intimate, so the double headed arrow has to be abandoned; it is an illusion and the C must be moved. Second it says that perception is a purely private affair, completely uninfluenced by other people, past or present, and this must be quite wrong: we can, and frequently do, tell other people about our perceptions, but there is nothing shown in the middle box of fig 1 that would make this possible.

The bare internal loop consists of:- physical stimulus - sensory message - reconstruction of physical event - perception. What must be added is a stage producing a describable representation that can be transmittted verbally or by some other means, thus providing an external connection to other people. You will say "Yes but I know this external connection is not necessary, for I still perceive the world even when I do not tell other people about it". That is true, and we must suppose that conscious perception occurs when practicing or trying out external ***communication*** as well as

when it is used effectively, hence the multiple arrows in the diagram. When this external link is used effectively it can be extremely important to the social group of the person who is doing the communicating, and this could well be the main use for perception. The fact that it is often used tentatively, not effectively, does not diminish its importance; flowers look the same whether or not bees are extracting their nectar and fertilising them while doing so, yet no-one doubts that it is the bees' activities that give biological importance to the appearance of flowers: they look the way they do because this ensures they get pollinated. The fact that something is not necessary, and not always present, does not mean it is not important, and it is quite possible that the survival value of conscious perception lies in the communication mediated by the external connection - even though it does not seem that way to our introspection. The bare internal loop would have no survival value without its external connection, and this is what Friedrich ***Nietzsche*** (1887) implied when he said:- "Consciousness is really only a net of communication between human beings; it is only as such that it had to develop; a solitary human being who lived as a beast of prey would not have needed it". If this is correct, the details of conscious perception will depend upon the ***external connection***, not the purely ***private aspects***, just as the form and colour of wild flowers depend upon the bee's visual system. It is therefore a serious error for psychologists and philosophers interested in perception to neglect the external connection.

As shown in fig 1 the external loop is passive and has no effect on the internal loop, so a defendant of the exclusively private, personal, view of perception might say "OK there <u>is</u> an external connection, but there is no means by which this can influence the inner loop: the arrow points externally, and there are no causal arrows pointing the other way". To a

biologist it is obvious that this argument is false. If it is the external connection that gives perception its survival value, natural selection is smart enough to ensure that the whole system will be effective in conveying knowledge of the world to another person. The constraints on the inner loop implied by the need for effective communication will therefore be incorporated; for instance the requirement that perceptions be describable in the language of the external recipient must surely constrain their nature.

Moving from top to middle box raised doubts about the intimate connection between perception and the external world indicated by the double headed arrow, so we had to move the C to the arrow from the reconstructed world. For the third box we have added the external arrow, and my view is that conscious perception is represented by action along this arrow rather than the one from the reconstructed external world. Introspectively we <u>feel</u> perceptions arise in the world, but this arises from the most important use we make of perception - communicating it to others. We <u>have</u> to feel this, for why should those we communicate with trust us if we don't feel there is this connection? But the physiological facts show that our introspections are misleading for it is certainly a very indirect connection.

As Marcel (1983) has pointed out, those towards whom the external arrow points can have powerful and deep influences. We tailor all our communications to the backgound knowledge and expectations of those we are communicating with, and there is no reason to believe that communications about our conscious perceptual experience are any different in this regard. Furthermore, as I shall explain below, our perceptions have certainly been tailored before we are aware of them, and there are powerful forces determining our beliefs and motivations that we are also unaware of. I think these unconscious forces have written a

hidden agenda for perception, but rather than continuing the argument along the lines I have started, I shall now tell you how and why I have come to believe this. I shall not attempt a scholarly account of the ideas that have influenced me and their sources, but shall describe brief autobiographical incidents that I look back upon as being important in forming my opinions, but of course there may be others that I do not recall. ***Wittgenstein*** was a much-talked-about figure when I was an undergraduate at Cambridge, and my emphasis on the use to which perception is put may echo his dictum about language "Don't ask for the meaning, ask for the use" (see Fann 1971).

Freud at fourteen

I am the youngest of a large family, and when I was about 14 an older brother who had just started medical school brought back two volumes of ***Freud*** over the summer holidays - *Psychopathology of Everyday Life,* and *Totem and Taboo,* as far as I can remember. I read quite a lot of the two books, and Freud was a frequent topic of family conversation. The general attitude was sceptical rather than hostile, and I remember my own response was to be unconvinced by the detailed arguments and unsatisfied by the examples, but enormously interested in one general message: people do not, and perhaps cannot, give accurate reasons for their actions and beliefs, even when they are convinced that they can. Observation of other people's behaviour and of the explanations they gave for it was sufficient to verify for me the truth that people have unconscious, as well as conscious, minds, and this is very generally accepted today, though it was not 60 years ago. I realised that what was true for other minds was likely to be true for my own, and from that summer to the present day I have been a little wary of taking my direct conscious experiences of the world and my

introspections about them at their face value, for there could be hidden forces at work.

But if there is a hidden agenda, who writes it? A schoolboy has no difficulty introspecting about father figures and their surrogates, so their agenda did not seem to be hidden, but I recall an episode that, subsequently at least, seems revealing. At that time I was at a boarding school, and the day started at 7 am with a cold bath, followed by a cup of cocoa; then we had to walk 7 minutes to a service in the college chapel. A straw hat was a compulsory part of the uniform, and one day I forgot it and had walked most of the way to chapel without it when I suddenly became aware that it was missing. I can still to the present day feel the sense of shame and horror at what felt like something 1000 times more disgraceful than complete nudity! I rushed back to get the hat, but arrived late for chapel, and can remember that moment of late arrival too. I probably received a mild reprimand, but if so I cannot remember that; what I recall so vividly is the self-administered reprimand for having transgressed the tribal code.

How can such a trivial episode make such a deep impression? A few years later I found what I think is the answer in another book I came across at home, Wilfred ***Trotter***'s *Instincts of the Herd in Peace and War.* This is not very well-known, and I think my parents had the book because they had personally known the author, a brilliant surgeon with broad interests in neurology, psychology and sociology. Although a surgeon, he had some knowledge of the Freudian doctrines that were just beginning to enter the ranks of medecine in 1909 when the book was sketched out. It was published in 1916, no doubt because he realised it was relevant to problems of shell-shocked soldiers and the civilian mass-hysteria of the first world war. Its message is that humans are deeply social animals and the herd instinct is a

force as powerful in humans as the other primary instincts of self-preservation, nutrition, and sex, though it is largely unrecognised by our conscious minds. He was more charitable towards Freud's interpretations than is fashionable today and does not directly challenge them, but he implies that it is the ***herd instinct*** that gives internal power to the repressive forces that conflict with the infant's egotistical drives during early development. This seems to be a very sensible modification of Freud's stark and over-stated assertions. He gives a convincing account of the way that instinctively driven, non-rational, beliefs appear to their owners, and of the way such beliefs are expounded by their owners. Many of the things we feel and say about our perceptions fit this description all too well. I have just looked at the book again, and although it is in some ways less satisfactory than I remembered it to be, its message has, deservedly I think, become part of my world view, and a part that continues to help me make sense of the behaviour of others, as well as myself. I think the external connection of fig 1 shows one means by which we pay our dues to the herd, and in view of the power of the herd instinct it is not unreasonable to suspect a reciprocal influence of herd opinion on our perception.

Noise and sensory thresholds

The next autobiographical episode I shall recount occurred much later, when I had started work in vision. In 1949 the view of rigorous psychophysicists, among whom I wished to be counted, was that the doorway to perception had a ***threshold***: if a stimulus was not strong enough to cross this threshold, then it had no effect on the sensorium. Through my membership of a group called the ***Ratio Club***[1] that met in

[1] The club had been started by John Bates, an electro-encephalographer from Queen's Square Hospital for Neurological Diseases, to discuss Shannon's newly published Information Theory, which Bates realised had relevance to the brain. It included Donald MacKay, Albert

London from time to time, and also through reading R A Fisher (1925), I realised that responses to weak stimuli could not be considered properly without taking ***noise*** into account, and once this was done the idea of a threshold required modifying. It was natural to replace the senseless idea of a step at the doorway to perception by the notion that, because of the noise, there was a minimum intensity below which stimuli could not be detected reliably. This view implied that there was an element of convention in deciding whether to say "seen" or "not seen" to a weak stimulus, namely the standard of ***reliability*** that was deemed acceptable to the recipients of the message. There would be a distribution of values of the internal representations that resulted from noise alone, and convention would decree the point on this scale, the ***criterion***, that had to be exceeded in order to claim that a stimulus was present. If a high criterion was selected, there would be virtually no ***false positive responses*** to non-existent stimuli, but a stronger added stimulus would be needed to exceed that value so there would be the penalty of insensitivity; choice of a low criterion would improve sensitivity but bring the penalty of an increased rate of false positive responses. This notion therefore legitimised false positive responses, and also implied that the criterion might be adjustable according to the standard of reliability that was expected.

At about that time I started a series of experiments with two other psychophysicists, both now world-famous in their own fields. Even though false positive responses were known to occur quite regularly, one of my colleagues regarded them as discreditable errors that could be avoided. Just before starting a run as an observer he made the remark that, even if the record of the results showed that he had made a false

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Uttley, Phillip Woodward, Tommy Gold, Pat Merton, William Rushton, and occasional visitors such as Alan Turing and Warren McCulloch.

positive response, he would not believe that he had seen something that was not there but would attribute it to a recording error or some other mistake. I was running that particular experiment, recording the responses, changing filters, and occasionally inserting a thick piece of black card to give a blank stimulus. Quite soon he gave a "seen" response when I knew the black card was in place, so although it meant abandoning the run I said "Hey, did you really see that?". He confirmed that he had, so I said "Come and look which filter is in place". He looked at the black card and acknowledged glumly that he had experienced a visual sensation from a blank stimulus, but he was seriously upset; we could never persuade him to come anywhere near that equipment ever again and the collaboration had to be abandoned. I think he felt he had done something discreditable according to his tribal code and was torn whether to abandon the code or accept the discredit.

A few years later I went to Steve Kuffler's lab in Baltimore to work on the retinal ganglion cells of the cat. He had found that they give a rapid, highly irregular, discharge even in the absence of any stimulation by light, and if human ganglion cells behaved anything like that it seemed at first surprising that we can ever do anything other than give false responses. I was one of those who was arguing for the existence of noise in the visual pathway, but I was expecting that it would be hard work to prove its existence in the optic nerve, just as it had been hard work to prove psychophysically that there could be a background of noise to our perceptions. I was not expecting anything as loud and obvious as Kuffler had found, and we did many experiments testing whether it was an artefact due to electrode pressure, anaesthetic, or some other factor. We decided it was not (Kuffler, FitzHugh & Barlow 1957), and on reflection the result became perfectly reconcilable with my quantitative predictions (Barlow 1957) - provided that the retina's sensitivity to light was high

enough. It is the ratio of signal to noise that matters, not the absolute amount of noise, and we went on to show that the sensitivity was indeed high enough (Barlow, FitzHugh & Kuffler 1957).

Both my colleague's hidden agenda, written by his "thou-shalt-be-errorless" tribe, and my own agenda derived from the cryptic nature of noise in perception, had warped our perceptions of new facts, but there is something a bit seditious in the way that noise is suppressed in perception. We do not usually notice the backgound noise at all, although it is true that those who know about noise often do become aware of it, and those who know nothing about noise can be persuaded to reveal its presence by being asked to "guess" instead of reporting "seen" or "not-seen". But noise is undoubtedly much less prominent in perception than it is in the messages upon which perception is based, so reducing the prominence of noise must be an example of one item in the hidden agenda. It is clearly an item that supports the importance of the external connection in figure 1, for external communication would be useless if there were no standards of reliability.

Perception is not private

These autobiographical anecdotes should by now have made clear what I am driving at: it is the external connection in figure 1 that gives conscious perception its ***survival value***, and the need for the effectiveness of this link has ensured that our perceptual apparatus can deliver appropriate messages to be transmitted down that link. But this process does not stop with the innately determined formation of our perceptual apparatus. During life, our ***herd instinct*** gives the ***tribal voice*** extraordinary power and insistence, though we do not consciously recognise this. Through our social antennae we know very well what the tribe expects of us, and since we

have evolved to satisfy tribal dictates our perceptions are also liable to be modified to satisfy them. Figure 2 shows the parts of the inner loop and external connection that might be influenced in this way. I think the main influences of this sort are those connected with the use of language. It is of course advantageous for the external link to be used mainly for correct messages that are correctly understood by the recipient, but these messages may not have the simple directness that introspection suggests.

Many facts already fit this view well; for instance ***constancy*** phenomena can be regarded as steps to make our perceptual knowledge transferable, for other people are not interested in angular subtenses or ratios of cone excitation, but in absolute sizes and reflectances. We already recognise that sensory messages have been acted on in complex ways to yield our perceptions, and the three additions I have pointed to – reducing the prominence of noise, demanding that perceptions be verbally describable, and paying attention to the requirements of our conspecific tribal companions – are comparatively minor additions. I don't want to exaggerate the role of the hidden agenda, but it is often strenuously denied that there could possibly be any ***social influence*** on our apparently private perceptual experience, and I think this is a mistake: perception is not the purely private matter it seems to be, and it is the public aspects that are genuinely more important because it is these that give conscious perception its survival value.

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TWO ADDITIONS TO THE NAIVE VIEW OF PERCEPTION

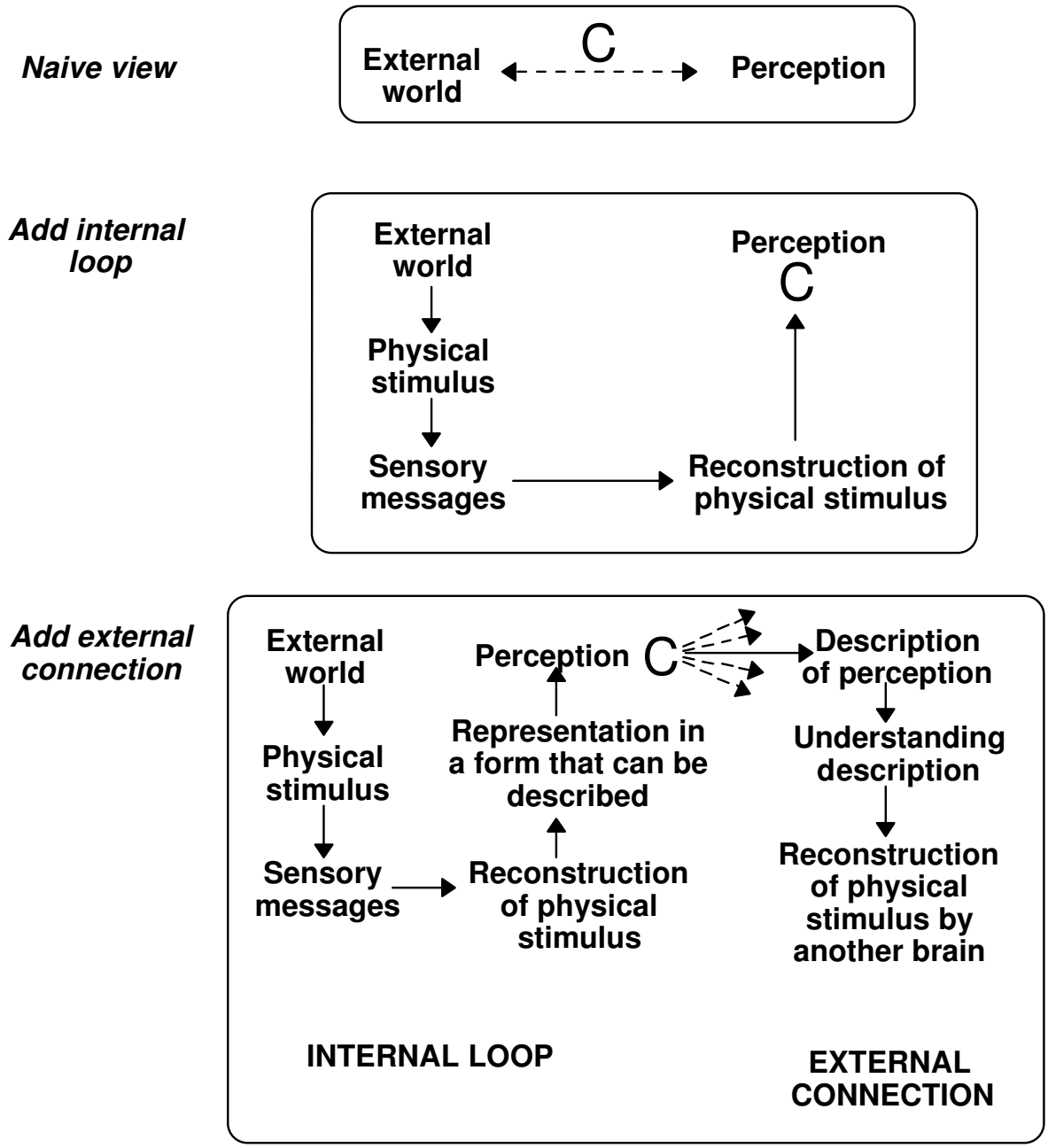

Figure 1 One must make two addtions to the naive view that our perceptual apparatus directly interacts with the external world. First one must recognise that there is an internal loop through sense organs and reconstructing mechanisms. Then one must recognise that the representation so formed is communicated to other people through an external link, and this requires additions to the mechanisms. It is argued in this

article that the external link provides the main survival value of our conscious perception, and also that conscious experience corresponds to the tentative or effective operation of this link .

HIDDEN INFLUENCES ON PERCEPTION

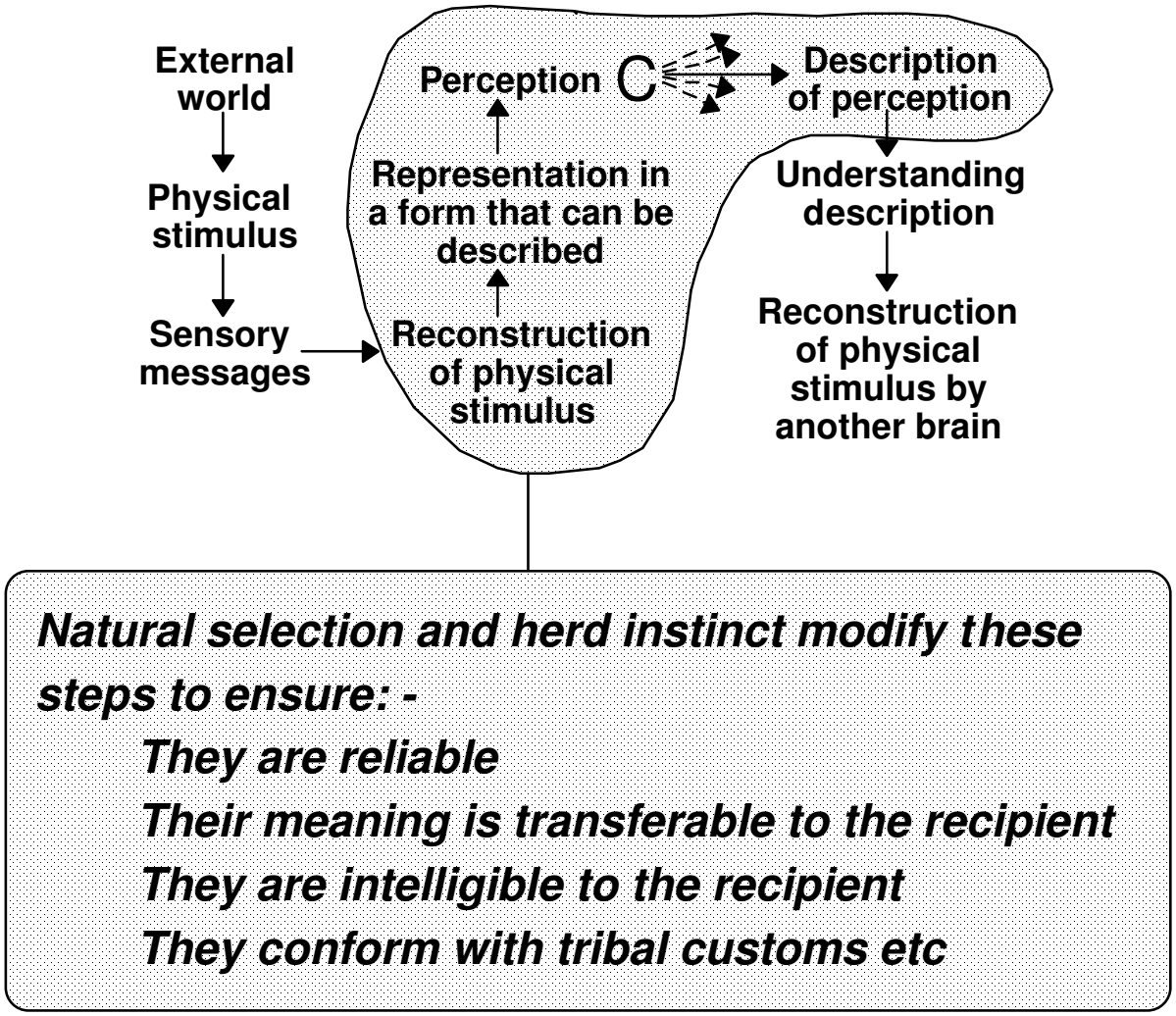

Figure 2. This illustrates the stages in the mechanisms of perception that might be influenced evolutionarily by the survival value of the external link introduced in figure 1.