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Subject: Words and models

[From Bill Powers (941224.2145 MST)]

Back from Boulder with some new-old perspectives. The newest one came from mulling over a couple of terms that have arisen recently. One was "elicit," from a definition of S-R theory that says stimuli "elicit" behaviors. The other was "select," as in "natural selection" or "consequences select x (whatever the latest thing x is).

If someone asks me what "a perception" means in PCT, I can answer that it refers to a signal in the brain that is some function of environmental variables. A request for an example might produce "One perception in a model of a tracking experiment is a variable whose value is proportional to the position of a cursor measured relative to the center of the screen." Or I may simply refer the questioner to a published article where perceptual signals are formally defined as part of a model or a simulation program, and say that is what I mean.

There is one piece of literature to which I will NOT refer the questioner: the dictionary. I think we have all been overlooking a critical fact about PCT and the models through which we express it most exactly. The whole reason for a model is to substitute exact quantitative language for informal everyday language in which the basic definitions always come down to an individual's private interpretations learned in childhood. Words like "elicit" and "select" have definitions, but the only place to find agreed-upon definitions is in the dictionary. Even though you will find these words in scientific papers, they have no scientific meanings.

The dictionary can't provide scientific meanings, nor can any method for defining words in terms of other words. All verbal definitions boil down, in the end, to a set of terms that you either understand or don't understand. "Understand" is defined in terms of "comprehend," and "comprehend" is defined in terms of "understand." All attempts to find the meaning of a word in a dictionary end up in a few tight little circles using terms that can be defined only as synonyms for each other.

This applies, of course, to ordinary discourse as well. If you ask someone what he means by a word, he will give you more words. You, of course, will assume that you understand each of those new words, but that is a false assumption: you don't even understand the words you use yourself, if your only way to explain what they mean is by generating more words. To prove that to yourself, ask a friend to find out what you mean by a simple sentence: the bat flies at night, for example. What does "The" mean? "Bat?" "Flies?" "At?" "Night?" And when you supply some sort of meaning, let the friend write it down and ask about each of those words. More practically, just follow one of the important words, then one of the important words used to define it, and so on. You will ALWAYS end up saying "Well, dammit, you KNOW what I mean!" Or you will end up pointing to something, or demonstrating something by actions.

Try this out with the word "select" or any alternate form of it. What does it mean? It means word1, word2, word3..... And what does word1 mean, and word2 and so on? In the end you'll find it doesn't mean anything but other words -- when you go at it this way.

The concept of an operational definition goes one small step toward finding a solution to this problem. The operational definition is useful not because it defines things in terms of operations, but because it encourages us to define them as _experiences_, as _perceptions_ that are not words. What does "tickle" mean? An operational definition says that if you apply certain operations to another person, that person will laugh, yet try to stop you. But that definition is as useless as the informal one -- unless you happen to be the one on whom the operation is performed. If you are the one being tickled by a Ukrainian, you know what the Ukrainian word for tickle means even if you don't speak Ukrainian. The real meaning has nothing to do with other Ukrainian words, or with operations performed by a Ukrainian. It has to do with the experience of being tickled. If you're not ticklish, then try this with "hurt" or "salty." If you're Ukrainian, substitute a speaker of any language you don't know.

Or try it with a word like "understanding." Perhaps some of you, reading the previous paragraph, came to understand something you had not understood before. If so, I can now define understanding: it's what you experienced at some point in the previous paragraph. All I have to do is to say that "understanding" is that experience, and you need no further words to know what this term is to mean when you next hear it. In fact, any _WORDS_ you may try to use to convey to someone else what you experienced will completely fail, because understanding can't be defined in other words. It's a nonverbal experience: a nonverbal perception.

My point is this: no theory expressed entirely in words can mean anything on which different people can agree. The statement "stimuli elicit responses" means nothing, because "elicit" means nothing. The place in experience where this word points is empty. The sole purpose of this word is to fill the place in the sentence where a reference to an experiencable operation is supposed to go. But there is no operation called eliciting. We use this word when we want to sound as if we're talking about an operation, but don't know what operation. The word is a transitive verb, so conveys the sense that the stimulus is doing something or other to result in a response. But "something or other" is all that "elicit" means.

The same is true of "select" in the sentence "consequences select behaviors". They do what to behaviors? Why, they "select" them. And how does something or someone go about "selecting" something? A number of images may come to mind, but none of them fits what a physical consequence is said to do to the behavior it selects. We do not have an array of different behaviors, all present at the same time, to which the consequence can point, as we point to the ice-cream we want to select in a Baskin-Robbins. We do not pass a whole mix of behaviors through some sort of sieve to select the one we want, as we use a real sieve to select the raisins (we hope) in the sugar bowl. The thing said to be doing the selecting does not appoint, declare, designate, name, choose, specify, elect, prefer, or favor the thing selected. Neither does it adjust, align, dial, or tune it. You, too, can consult a thesaurus, and you will not find any connotation of the verb "to select" that is within the capabilities of a consequence such as a kibble dropping into a dish.

And don't bother with the dictionary: for "select," mine says "to choose in preference to another or others." And "choose," of course, is "to select from or in preference to another or other things or persons." What "select" or "choose" or "pick" really means is what you do when you want all the pieces of candy but are told by a grownup that you can have only one. These are not scientific terms; we learned them as children, and as children we continue to use them.

Psychological theories are constructed almost entirely from words we are already supposed to know and knew before we starting thinking about things like psychology. These words refer to nonverbal experiences if they're not just pointers to other words. But nobody ever pauses to pick the critical words and tie them to a specific, standard, defining experience that everyone is to mean when they use the word. If a theorist speaks of "level of aspiration," everyone hearing the word gets to supply his own private experience to go with "aspiration." If the theorist says that stimuli "elicit" responses, everybody gets to imagine his or her own process called eliciting, whether it involves pulling on a string, waving a wand, or pushing the plunger that sets off the dynamite.

And when somebody says that consequences "select" behavior, you're free to imagine any process at all that seems to you like selecting. You can imagine any specific process, simple or complex, and arbitrarily say to yourself that this is what selecting means. After all, when other people talk to you about selecting, they can't see what you're imagining. They'll just assume that you're imagining what they're imagining.

Modeling and simulation try to find a different way to express scientific theories. There are no ambiguities or alternate meanings in a simulation. Each variable has to depend on other variables in a completely explicit way, or the model won't run. When we tie the organization and behavior of a simulation to real behavior, we are supposed to recognize in the stimulation something that we also recognize in real behavior, without going through the intermediary of words.

This is why the rubber-band experiments, the various parts of Demo1, and other experiments and demonstrations of PCT are so important. They provide experiential meanings for the formal terms of PCT. In the running simulation you can see relationships directly, without naming them, and put them into direct correspondence with parts of the model. The worst mistake anyone can make in attempting to understand PCT is to take the basic experience and translate it first into the language of ordinary psychology, which is to say into natural language, and then try to find parallels between the model and the verbal representations. All linguists will tell you that this is the wrong approach for learning any new language. You must learn to go directly from the new language to the experience, not from the new language to the old language and then to the experience. The old language will impose its categories on what you're observing, so you will continue to use the old way of thinking even while using terms from the new language.

I make the same mistake that many other PCTers do when trying to explain PCT to adherents of other theories. We say "the organism varies its behavior to control the reinforcer." We should not say "reinforcer," because that calls to mind properties of the affected part of the environment that do not, in PCT, exist. We can admit that there is a relationship between rate of delivery of food pellets and rate of bar- pressings, but we do not have to admit that anything is going on but the processes of control. There's a certain amount of politeness in using the other guy's terms, but doing so hides the fact that PCT can explain the actual observed phenomena without using either those terms or their connotations.

There's another thought in here but I'm having trouble getting it into words. It's basically that because psychology uses natural-language terms in its theories, its theories are really just descriptions of experiences. They don't really explain anything. A simulation, however, does explain things, because it expresses the organization of a system in terms of simple and regular variables and relationships, publicly defined so we can't mistake their meanings. The parts of a simulation are not themselves the explanation, but what happens when they interact does constitute an explanation. Once we have a simulation that fits our experience of one simple situation, we can try it out in other situations and see if it still seems to capture everything we find important. In Demo1, we can ask "Does this really feel like what I do when I say I'm controlling something?" And if it does, we can ignore all the old words for what is going on, because now we have a more direct link between the experienced process and the formal structure of a model. We can say, "Whatever is going on right now is what I intend for the word control to mean."

As usual with ideas that go through one's head before actually waking up, there's less in these thoughts than there was when they went through a drowsier and more accepting mind. This is what was left.

Best to all Bill P.