Psychological research, theories and models.

Psychology as a science involves the application of scientific procedures and approaches in an attempt to understand human behaviour. Science is as much an attitude as a collection of methods. As an attitude, it insists on precision, consistency, and replicability. The methods resulting from this attitude consists of rules intended to eliminate subjectivity, bias, and the influence of random factors so that we can have confidence in the conclusions of scientific research. One way of conduction scientific research is the experiment but there are several other scientific methods.

Science is a collection of methods and attitudes that relate directly to how we discover and accumulate ‘facts’ (i.e. providing knowledge). However, in psychology it is perhaps too strong a word to use since the word fact implies a degree of certainty and accuracy that is not always possible in psychology where ‘facts’ are simply observations of events, behaviours or relationships. Science insists that these observations be made under controlled conditions so that the same observations can be made by anyone, i.e. they can be replicated. Facts (or observations) would be of limited value to psychologists if they were not organised, summarised, and simplified. That’s where theory comes in. Basically, a theory is a collection of related statements whose principal function is to summarise and explain observations. For example, when I repeatedly see Susan refuse to come to a party, go with us to the cinema or join a tennis match, I try to explain her behaviour using what is called ‘a naive theory’. Susan does not like to be with a lot of people at the same time, that’s my theory. We all make theories like this one, and psychologists call them naive or implicit theories. They are different from formal theories in that they express personal convictions that need only be believed but not scientifically proved. Formal theories, on the contrary, must be tested, i.e. it is not enough to believe that a psychological theory is true for all important observations and relationships. It must be demonstrated that it is actually true.

Some theories are more useful than others because they reflect the facts observed. Some theories do not reflect the facts very well. If, for example, Susan plays tennis and goes partying with other people, my theory is not true because it does not fit with the facts.

According to Thomas (1996) a theory is good if it

- accurately reflects observations
- is expressed clearly
- is useful for predicting as well as explaining
- lends itself to practical applications
- is consistent rather than self-contradictory
- is not based on numerous assumptions (unproven beliefs)
- is thought provoking and provide satisfying explanations
The most useful theories are those that not only serve to explain observations but also to predict events. My naive theory about Susan, for example, allows me to predict that she’ll refuse all social invitations, no matter who issues them. As we saw, however, in this case the prediction is inaccurate because the theory does not account for certain important facts (particularly why she accepts other people’s invitation). It seems that a theory that fits the facts better would lead to more accurate predications.

Example of how we could distinguish what is a good theory
Criteria of a good theory, applied to Grandma Francoeur’s fertiliser theory¹.

This theory holds, in part, that
- horse manure stimulates potatoes and carrots
- chicken droppings invigorate cabbages
- Dried cow dung excites flowers.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Grandma Francoeur’s Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does it reflect the facts?</td>
<td>Yes, if carrots, potatoes, and other plants behave as expected under specified conditions.</td>
</tr>
<tr>
<td>Is it clear and understandable?</td>
<td>It is quite clear and understandable except to the very stupid, who are seldom asked to judge theories.</td>
</tr>
<tr>
<td>Is it useful for predicting as well as explaining?</td>
<td>Very. For example, the theory allows the gardener to predict in the spring what will happen in the fall, depending on the fertiliser used. And the predictions are clearly falsifiable. Thus, the theory can be tested directly.</td>
</tr>
<tr>
<td>Is it practically useful?</td>
<td>Clearly, yes, for those engaged in the growing of vegetables.</td>
</tr>
<tr>
<td>Is it internally consistent?</td>
<td>Unfortunately no. The old lady has sometimes claimed that chicken droppings are better for potatoes than horse manure.</td>
</tr>
<tr>
<td>Is it based on many unverifiable assumptions?</td>
<td>No. The assumptions upon which it is based could be verified- or falsified.</td>
</tr>
<tr>
<td>Is it satisfying and thought provoking? Does it have heuristic value?</td>
<td>Oh Yes!</td>
</tr>
</tbody>
</table>

Summing up
A theory: a statement- or a collection of statements- whose main function is to summarise, simplify, organise, and explain observations and to permit predictions about events relation to this set of observations. These statements may be described as laws, principles or beliefs (difference between formal theories and implicit theories!!!).

Laws are statements whose accuracy is generally beyond question. In the natural sciences (physics, chemistry, astronomy etc.) there are numerous laws. It is much more difficult to make laws about human behaviour (and therefore also more difficult to predict what humans will do).

Principles are statements that are probable rather than certain. Unlike laws, they are always open to a degree of doubt, to a certain level of probability (and improbability).

Accordingly, most psychological statements about human behaviour and experience take the form of principles rather than laws. Beliefs are more private and personal than either principles or laws. Beliefs are our individual convictions, our personal attempts to explain observations. Beliefs are often based on personal experience but can also be based on the same sort of scientific observations that give rise to more formal theories. It may be important to understand what beliefs or what sort of models underlie people’s thinking if you want to change something (e.g. students’ belief about how to study efficiently).

A model is like a pattern or a blueprint, it’s a representation of how things are or how they can be or should be. We could also say that a model is an organised set of beliefs about something important.

Models can be very specific and concrete, and they are often included in, or derived from, theories (e.g. models of atomic structures or memory systems).

Models can also be very general, e.g. A model that represent all our beliefs and assumptions about human nature. In this sense, each of us has implicit models that govern our view of the world and guide our beliefs and our behaviour.

Psychological models are essentially metaphors, i.e. they are more likely to suggest what humans could be like (e.g. “humans behave as though they were like this or that”) and not what they are like (e.g. “humans are this or that”). Accordingly, models, like theories, should not be judged in terms of their accuracy but rather in terms of their usefulness. A theory - or a model- is neither right nor wrong, it is simply more or less useful (Wellman and Gelman, 1992).