The Theory Underlying Concept Maps and How to Construct and Use Them


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Introduction

Concept maps are graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line, referred to as linking words or linking phrases, specify the relationship between the two concepts. We define concept as a perceived regularity in events or objects, or records of events or objects, designated by a label. The label for most concepts is a word, although sometimes we use symbols such as + or %, and sometimes more than one word is used. Propositions are statements about some object or event in the universe, either naturally occurring or constructed. Propositions contain two or more concepts connected using linking words or phrases to form a meaningful statement. Sometimes these are called semantic units, or units of meaning. Figure 1 shows an example of a concept map that describes the structure of concept maps and illustrates the above characteristics.

Another characteristic of concept maps is that the concepts are represented in a hierarchical fashion with the most inclusive, most general concepts at the top of the map and the more
specific, less general concepts arranged hierarchically below. The hierarchical structure for
a particular domain of knowledge also depends on the context in which that knowledge is
being applied or considered. Therefore, it is best to construct concept maps with reference
to some particular question we seek to answer, which we have called a focus question. The
concept map may pertain to some situation or event that we are trying to understand
through the organization of knowledge in the form of a concept map, thus providing the
context for the concept map.

Another important characteristic of concept maps is the inclusion of cross-links. These are
relationships or links between concepts in different segments or domains of the concept
map. Cross-links help us see how a concept in one domain of knowledge represented on the
map is related to a concept in another domain shown on the map. In the creation of new
knowledge, cross-links often represent creative leaps on the part of the knowledge
producer. There are two features of concept maps that are important in the facilitation of
creative thinking: the hierarchical structure that is represented in a good map and the ability
to search for and characterize new cross-links.

A final feature that may be added to concept maps is specific examples of events or objects
that help to clarify the meaning of a given concept. Normally these are not included in
ovals or boxes, since they are specific events or objects and do not represent concepts.
Concept maps were developed in 1972 in the course of Novak’s research program at Cornell where he sought to follow and understand changes in children’s knowledge of science (Novak & Musonda, 1991). During the course of this study the researchers interviewed many children, and they found it difficult to identify specific changes in the children’s understanding of science concepts by examination of interview transcripts. This program was based on the learning psychology of David Ausubel (1963; 1968; Ausubel et al., 1978). The fundamental idea in Ausubel’s cognitive psychology is that learning takes place by the assimilation of new concepts and propositions into existing concept and propositional frameworks held by the learner. This knowledge structure as held by a learner is also referred to as the individual’s cognitive structure. Out of the necessity to find a better way to represent children’s conceptual understanding emerged the idea of representing children’s knowledge in the form of a concept map. Thus was born a new tool not only for use in research, but also for many other uses.

**Psychological Foundations of Concept Maps**

The question sometimes arises as to the origin of our first concepts. These are acquired by children during the ages of birth to three years, when they recognize regularities in the world around them and begin to identify language labels or symbols for these regularities (Macnamara, 1982). This early learning of concepts is primarily a discovery learning process, where the individual discerns patterns or regularities in events or objects and recognizes these as the same regularities labeled by older persons with words or symbols. This is a phenomenal ability that is part of the evolutionary heritage of all normal human beings. After age 3, new concept and propositional learning is mediated heavily by language, and takes place primarily by a reception learning process where new meanings are obtained by asking questions and getting clarification of relationships between old concepts and propositions and new concepts and propositions. This acquisition is mediated in a very important way when concrete experiences or props are available; hence the importance of “hands-on” activity for science learning with young children, but this is also true with learners of any age and in any subject matter domain.

In addition to the distinction between the discovery learning process, where the attributes of concepts are identified autonomously by the learner, and the reception learning process, where attributes of concepts are described using language and transmitted to the learner, Ausubel made the very important distinction between rote learning and meaningful learning. Meaningful learning requires three conditions:

1. The material to be learned must be conceptually clear and presented with language and examples relatable to the learner’s prior knowledge. Concept maps can be helpful to meet this condition, both by identifying large general concepts held by the learner prior
to instruction on more specific concepts, and by assisting in the sequencing of learning tasks though progressively more explicit knowledge that can be anchored into developing conceptual frameworks.

2. The learner must possess relevant prior knowledge. This condition can be met after age 3 for virtually any domain of subject matter, but it is necessary to be careful and explicit in building concept frameworks if one hopes to present detailed specific knowledge in any field in subsequent lessons. We see, therefore, that conditions (1) and (2) are interrelated and both are important.

3. The learner must choose to learn meaningfully. The one condition over which the teacher or mentor has only indirect control is the motivation of students to choose to learn by attempting to incorporate new meanings into their prior knowledge, rather than simply memorizing concept definitions or propositional statements or computational procedures. The indirect control over this choice is primarily in instructional strategies used and the evaluation strategies used. Instructional strategies that emphasize relating new knowledge to the learner’s existing knowledge foster meaningful learning. Evaluation strategies that encourage learners to relate ideas they possess with new ideas also encourage meaningful learning. Typical objective tests seldom require more than rote learning (Bloom, 1956; Holden, 1992). In fact, the worst forms of objective tests, or short-answers tests, require verbatim recall of statements and this may be impeded by meaningful learning where new knowledge is assimilated into existing frameworks, making it difficult to recall specific, verbatim definitions or descriptions. This kind of problem was recognized years ago in Hoffman’s (1962) The Tyranny of Testing.

As noted above, it is important to recognize that because individuals vary in the quantity and quality of the relevant knowledge they possess, and in the strength of their motivation to seek ways to incorporate new knowledge into relevant knowledge they already possess, the rote-meaningful distinction is not a simple dichotomy but rather a continuum. Creativity can be seen as a very high level of meaningful learning, and we will discuss this further. These ideas are shown in Figure 2.

People often confuse rote learning and meaningful learning with teaching approaches that can vary on a continuum from direct presentation of information (which may be conceptually obscure or conceptually explicit) to autonomous discovery approaches where the learner perceives the regularities and constructs her/his own concepts. Both direct presentation and discovery teaching methods can lead to highly rote or highly meaningful learning by the learner, depending on the disposition of the learner and the organization of the instructional materials. These distinctions are shown in Figure 3. There is the mistaken notion that “inquiry” studies will assure meaningful learning. The reality is that unless students possess at least a rudimentary conceptual understanding of the phenomenon they are investigating, the activity may lead to little or no gain in their relevant knowledge and may be little more than busy work. In fact, the research basis for support of widely
recommended inquiry learning is largely absent (Mayer, 2004; Kirschner et al., 2006, Sweller, et al., 2007).

One of the powerful uses of concept maps is not only as a learning tool but also as an evaluation tool, thus encouraging students to use meaningful-mode learning patterns (Mintzes et al., 2000; Novak, 1990; Novak & Gowin, 1984). Concept maps are also effective in identifying both valid and invalid ideas held by students, and this will be discussed further in another section. They can be as effective as more time-consuming clinical interviews for identifying the relevant knowledge a learner possesses before or after instruction (Edwards & Fraser, 1983).

Another important advance in our understanding of learning is that the human memory is not a single “vessel” to be filled, but rather a complex set of interrelated memory systems. Figure 4 illustrates the memory systems of the human mind, and interactions with inputs from our affective and psychomotor inputs.

While all memory systems are interdependent (and have information going in both directions), the most critical memory systems for incorporating knowledge into long-term memory are the short-term and “working memory.” All incoming information is organized and processed in the working memory by interaction with knowledge in long-term memory. The limiting feature here is that working memory can process only a relatively small number of psychological units (five to nine) at any one moment (Miller, 1956).
This means that relationships among two or three concepts are about the limit of working memory’s processing capacity. For example, if a person is presented with a list of 10-12 letters or numbers to memorize in a few seconds, most will recall only 5 to 9 of these. However, if the letters can be grouped to form a known word, or word-like unit, or the numbers can be related to a phone number or something known, then 10 or more letters or numbers can be recalled. In a related test, if we give learners 10-12 familiar but unrelated words to memorize in a few seconds, most will recall only 5-9 words. If the words are unfamiliar, such as technical terms introduced for the first time, the learner may do well to recall correctly two or three of these. Conversely, if the words are familiar and can be related to knowledge the learner has in her/his cognitive structure, e.g. months of the year, 12 or more may be easily recalled.

It should be noted that retention of information learned by rote still takes place in long term memory, as does information learned meaningfully; the difference is that in rote learning, there is little or no integration of new knowledge with existing knowledge resulting in two negative consequences. First knowledge learned by rote tends to be quickly forgotten, unless much rehearsed. Second, the knowledge structure or cognitive structure of the learner is not enhanced or modified to clear up faulty ideas. Thus misconceptions will
persist, and knowledge learned has little or no potential for use in further learning and/or problem solving (Novak, 2002).

Therefore, to structure large bodies of knowledge requires an orderly sequence of iterations between working memory and long-term memory as new knowledge is being received and processed (Anderson, 1992). We believe one of the reasons concept mapping is so powerful for the facilitation of meaningful learning is that it serves as a kind of template or scaffold to help to organize knowledge and to structure it, even though the structure must be built up piece by piece with small units of interacting concept and propositional frameworks. Many learners and teachers are surprised to see how this simple tool facilitates meaningful learning and the creation of powerful knowledge frameworks that not only permit utilization of the knowledge in new contexts, but also the retention of the knowledge for long periods of time (Novak, 1990; Novak & Wandersee, 1991). There is still relatively little known about memory processes and how knowledge finally gets incorporated into our brain, but it seems evident from diverse sources of research that our brain works to organize knowledge in hierarchical frameworks and that learning approaches that facilitate this process significantly enhance the learning capability of all learners (Bransford et al., 1999; Tsien, 2007).
Obviously, our brains store more than concepts and propositions. While the latter are the principal elements that make up our knowledge structures and form our cognitive structure in the brain, we pause briefly to discuss other forms of learning. Iconic learning involves the storage of images of scenes we encounter, people we meet, photos, and a host of other images. These are also referred to as iconic memories (Sperling, 1960; 1963). While the alphanumeric images Sperling used in his studies were quickly forgotten, other kinds of images are retained much longer. Our brains have a remarkable capacity for acquiring and retaining visual images of people or photos. For example, in one study (Shepard, 1967) presented 612 pictures of common scenes to subjects, and later asked which of two similar pictures shown was one of the 612 seen earlier? After the presentation the subjects were 97% correct in identifying picture they had seen. Three days later, they were still 92% correct, and three months later they were correct 58% of the time. This and many other studies have shown that humans have a remarkable ability to recall images, although they soon forget many of the details in the images. Considering how often we look at pennies, it is interesting that the subjects asked to draw a penny in a study by Nickerson and Adams (1979) omitted more than half of the features or located them in the wrong place. We believe that integrating various kinds of images into a conceptual framework using concept mapping software like CmapTools (described below) could enhance iconic memory, and we hope research on this will be done.

Human’s ability to recall sounds is also remarkable. The learning and recall of sounds is also referred to as archic memory. Consider the musician who can play hundreds of songs without reading any music. Again we are dealing with memories that are not coded as concepts or propositions. Studies by Penfield & Perot (1963), among others, indicate that regions of our brain that are activated when we hear sounds are the same regions that are active when we recall sounds. While we can locate regions of the brain that are active in learning or recall of information using positron emission tomography (PET) scans, the specific mechanisms by which neurons store this information is not known. A full discussion of memory mechanisms is beyond the scope of this document.

There are obvious differences between individual’s abilities, and some of these have been explored by Gardner (1983). He has proposed a Theory of Multiple Intelligences. His work has received much attention in education and has served to draw attention to the broad range of differences in human abilities for various kinds of learning and performance. It is good that schools are recognizing that there are important human capabilities other than the recall of specific cognitive information so often the only form of learning represented in multiple-choice tests used commonly in schools and corporations. One reason we encourage the integration of the broad range of activities represented in our New Model for Education is to provide opportunities for these other abilities to be represented and expressed. Nevertheless, we seen the organizing opportunities afforded by associating the various activities with an explicit knowledge structure as very beneficial. Time will tell if future research studies will support this claim.
While it is true that some students have difficulty building concept maps and using these, at least early in their experience, this appears to result primarily from years of rote-mode learning practice in school settings rather than as a result of brain structure differences per se. So-called “learning style” differences are, to a large extent, derivative from differences in the patterns of learning that students have employed varying from high commitment to continuous rote-mode learning to almost exclusive commitment to meaningful mode learning. It is not easy to help students who are habituated to rote mode learning to move to practices of meaningful learning. While concept maps can help, students also need to be taught something about brain mechanisms and knowledge organization, and this instruction should accompany the use of concept maps. The information in the above paragraphs should become part on the instructional program for skillful use of concept maps. The information provided in this document could be part of this instruction. Other ideas for improving instruction to achieve understanding of the subject is available elsewhere (Mintzes et al., 1998).

To illustrate how difficult it can be for individuals to modify their ideas, especially if they learn primarily by rote, we cite the example of interviews done by the Private Universe Project (PUP) at Harvard University (Schneps, 1989). The staff of PUP interviewed 23 Harvard graduates, alumni and faculty, asking each “Why do we have seasons?” Only eleven concepts, properly organized are needed to understand why we have seasons, and one arrangement of these concepts is shown in Figure 5. The PUP interviewers found that 21 of the 23 interviewed could not explain why we have seasons, a topic that is taught repeatedly in school. Included in this group was a graduate who had recently taken a course in the Physics of Planetary Motion, who also believed erroneously that seasons were caused by the earth moving closer to the sun in summer and further away in the winter. In fact, the earth is slightly closer to the sun when it is winter in Massachusetts, rather than in summer. The primary reason we have seasons in latitudes away from the equator is due to the tilt of the earth on its axis toward the sun in summer resulting in longer days and more direct radiation, thus greater heating. In winter, the axis of the earth points away from the sun, thus resulting in shorter days and less intense radiation. What is interfering with these 21 Harvard people is confusion with the common experience that when we are closer to a fire or lamp, the heat is more intense than when we are further away. Thus, these people have failed to recognize that this same phenomenon is not operating to give seasons on Earth. They are transferring knowledge from one context to another, but incorrectly. This is commonly observed in many, many examples of “misconceptions” in every field of study. The only solution to the problem of overcoming misconceptions is to help learners learn meaningfully, and using concept maps can be very helpful. (For more information on misconceptions in science and mathematics see Novak (2002), and: www.mlrg.org).
Epistemological Foundations of Concept Maps

As indicated earlier, we defined concept as a *perceived regularity (or pattern) in events or objects, or records of events or objects, designated by label*. It is coming to be generally recognized now that the meaningful learning processes described above are the same processes used by scientists and mathematicians, or experts in any discipline, to construct new knowledge. In fact, Novak has argued that new *knowledge creation* is nothing more than a relatively high level of meaningful learning accomplished by individuals who have a well organized knowledge structure in the particular area of knowledge, and also a strong emotional commitment to persist in finding new meanings (Novak, 1977, 1993, 1998). *Epistemology* is that branch of philosophy that deals with the nature of knowledge and new knowledge creation. There is an important relationship between the psychology of learning, as we understand it today, and the growing consensus among philosophers and
epistemologists that new knowledge creation is a constructive process involving both our knowledge and our emotions or the drive to create new meanings and new ways to represent these meanings. Learners struggling to create good concept maps are themselves engaged in a creative process, and this can be challenging, especially to learners who have spent most of their life learning by rote. Rote learning contributes very little at best to our knowledge structures, and therefore cannot underlie creative thinking or novel problem solving.

As defined above, concepts and propositions are the building blocks for knowledge in any domain. We can use the analogy that concepts are like the atoms of matter and propositions are like the molecules of matter. There are only around 100 different kinds of atoms, and these make up an infinite number of different kinds of molecules. There are now about 460,000 words in the English language (most of which are concept labels), and these can be combined to form an infinite number of propositions. Although most combinations of words might be nonsense, there is still the possibility of creating an infinite number of valid and meaningful propositions. Poets and novelists will never run out of new ideas to express in new ways. We shall never run out of opportunities to create new knowledge! As people create and observe new or existing objects or events, the creative people will continue to create new concepts and new knowledge. Creating new methods of observing or recording events usually opens up new opportunities for new knowledge creation. For example, the creation of the concept mapping method for recording subject’s understandings has led new opportunities to study the process of learning and new knowledge creation.

While there is value in studying more extensively the process of human learning and human knowledge creation, this is beyond the scope of this document. The reader is invited to peruse some of the references cited. Some important considerations for construction of better concept maps and facilitation of learning will be discussed further below.

**Constructing Good Concept Maps**

In learning to construct a concept map, it is important to begin with a domain of knowledge that is very familiar to the person constructing the map. Since concept map structures are dependent on the context in which they will be used, it is best to identify a segment of a text, a laboratory or field activity, or a particular problem or question that one is trying to understand. This creates a context that will help to determine the hierarchical structure of the concept map. It is also helpful to select a limited domain of knowledge for the first concept maps.

A good way to define the context for a concept map is to construct a *Focus Question*, that is, a question that clearly specifies the problem or issue the concept map should help to resolve. Every concept map responds to a focus question, and a good focus question can
lead to a much richer concept map. When learning to construct concept maps, learners tend to deviate from the focus question and build a concept map that may be related to the domain, but which does not answer the question. It is often stated that the first step to learning about something is to ask the right questions.

Given a selected domain and a defined question or problem in this domain, the next step is to identify the key concepts that apply to this domain. Usually 15 to 25 concepts will suffice. These concepts could be listed, and then from this list a rank ordered list should be established from the most general, most inclusive concept, for this particular problem or situation at the top of the list, to the most specific, least general concept at the bottom of the list. Although this rank order may be only approximate, it helps to begin the process of map construction. We refer to the list of concepts as a parking lot, since we will move these concepts into the concept map as we determine where they fit in. Some concepts may remain in the parking lot as the map is completed if the mapmaker sees no good connection for these with other concepts in the map.

The next step is to construct a preliminary concept map. This can be done by writing all of the concepts on Post-its™, or preferably by using the IHMC CmapTools (Cañas et al., 2004b, http://cmap.ihmc.us) computer software program described below. Post-its allow a group to work on a whiteboard or butcher paper and to move concepts around easily. This is necessary as one begins to struggle with the process of building a good hierarchical organization. Computer software programs are even better in that they allow moving of concepts together with linking statements and the moving of groups of concepts and links to restructure the map. When CmapTools is used in conjunction with a computer projector, two or more individuals can easily collaborate in building a concept map and see changes as they progress in their work. CmapTools also allows for collaboration between individuals in the same room or anywhere in the world, and the maps can be built synchronously or asynchronously, depending on the mapmakers’ schedules.

It is important to recognize that a concept map is never finished. After a preliminary map is constructed, it is always necessary to revise this map. Other concepts can be added. Good maps usually result from three to many revisions. This is one reason why using computer software is helpful.

Once the preliminary map is built, cross-links should be sought. These are links between concepts in different segments or domains of knowledge on the map that help to illustrate how these domains are related to one another. Cross-links are important in order to show that the learner understands the relationships between the sub-domains in the map.

It is important to help students recognize that all concepts are in some way related to one another. Therefore, it is necessary to be selective in identifying cross-links, and to be as precise as possible in identifying linking words that connect concepts. In addition, one should avoid “sentences in the boxes”, that is, full sentences used as concepts, since this
usually indicates that a whole subsection of the map could be constructed from the statement in the box. “String maps” illustrate either poor understanding of the material or an inadequate restructuring of the map. Figure 6 shows an example of a string map.

Students often comment that it is hard to add linking words onto the “lines” of their concept map. This is because they poorly understand the relationship between the concepts, or the meanings of the concepts, and it is the linking words that specify this relationship. Once students begin to focus-in on good linking words, and on the identification of good cross-links, they can see that every concept could be related to every other concept. This also produces some frustration, and they must choose to identify the most prominent and most useful cross-links. This process involves what Bloom (1956) identified as high levels of cognitive performance, namely evaluation and synthesis of knowledge. Concept mapping is an easy way to encourage very high levels of cognitive performance, when the process is done well. This is one reason concept mapping can also be a very powerful evaluation tool (Edmondson, 2000).
Finally, the map should be revised, concepts re-positioned in ways that lend to clarity and better over-all structure, and a “final” map prepared. When computer software is used, one can go back, change the size and font style, and add colors to “dress up” the concept map.

Thus, we see that concept maps are not only a powerful tool for capturing, representing, and archiving knowledge of individuals, but also a powerful tool to create new knowledge.

The CmapTools Software Toolkit

The CmapTools (Cañas et al., 2004b) software (available for download at: http://cmap.ihmc.us) developed at the Institute for Human and Machine Cognition brings together the strengths of concept mapping with the power of technology, particularly the Internet and the World Wide Web (WWW). The software not only makes it easy for users of all ages to construct and modify concept maps in a similar way that a word processor makes it easy to write text, it allows users to collaborate at a distance in the construction in their maps, publish their concept maps so anybody on the Internet can access them, link
resources to their maps to further explain their contents, and search the WWW for information related to the map.

The software allows the user to link resources (photos, images, graphs, videos, charts, tables, texts, WWW pages or other concept maps) located anywhere on the Internet or in personal files to concepts or linking words in a concept map through a simple drag-and-drop operation. Links to these resources are displayed as icons underneath the concepts, as shown in Figure 7. Clicking on one of these icons will display a list of links from which the user can select to open the linked resource. Using CmapTools, it is possible to use concept maps to access any material that can be presented digitally, including materials prepared by the mapmaker. In this way, concept maps can serve as the indexing and navigational tools for complex domains of knowledge, as will be illustrated later with NASA materials on Mars (Briggs et al., 2004). By facilitating the linking between concept maps, learners can construct Knowledge Models (Cañas et al., 2003b; Cañas et al., 2005), which are collections of concept maps with linked resources about a particular topic, demonstrating that their understanding about a domain is not limited to a single concept map.

Facilitating Collaborative and Distance Learning

There is a growing body of research that shows that when students work in small groups and cooperate in striving to learn subject matter, positive cognitive and affective outcomes result (Johnson et al., 1981; Berk & Winsler, 1995). Vygotsky (1978) introduced the idea that language and social dialogue can support learning, especially when members of the social group are at about the same Zone of Proximal Development (ZPD). He describes the ZPD as that level of understanding for a given subject where the learner can progress on her/his own, with minimal aid from a tutor. When students work cooperatively in groups and use concept maps to guide their learning, significantly greater learning occurs (Preszler, 2004). In our work with both teachers and students, small groups working cooperatively to construct concept maps have proven to be useful in many contexts. In the early 1990s, Latin America, students using the IBM Net (before the Internet) were very successful in creating concept maps both with students in their classroom and with students in other countries (Cañas et al., 2001). In our own classes and workshops, and in classes taught by our students and colleagues, small groups of students working collectively to construct concept maps can produce some remarkably good maps.

CmapTools provides extensive support for collaborative work during concept map construction. The concept maps built using CmapTools can be stored on servers (CmapServers, see: Cañas et al., 2003a) where anybody on the Internet can access them. Many of the CmapServers are “public”, allowing anybody (no authorization needed) to publish their collections of concept maps and resources (Cañas et al., 2004a). Through CmapServers, users of all ages and working in many disciplines have published thousands of maps on all topics and domains. While concept maps on these public servers are only a
sample of concept maps submitted by persons using CmapTools, and some do not meet our
criteria of good concept maps, they nevertheless serve to illustrate diverse applications.
When a concept map is saved to a CmapServer, a “web page” version of the map is also
stored, so a WWW browser is sufficient to browse through all the published concept maps.

Through the storing of concept maps in CmapServers, CmapTools encourages
collaboration among users constructing the maps. When maps are stored in a server on the
Internet, users with appropriate permissions (Cañas et al., 2003c) can edit shared concept
maps at the same time (synchronously) or at their convenience (asynchronously).
“Discussion threads” and “Annotations” in the form of electronic “Post-It” notes can be
used to make anecdotal comments on concept maps or during map construction. The high
degree of explicitness of concept maps makes them an ideal vehicle for exchange of ideas
or for the collaborative construction of new knowledge. We have also found that the
obstacles deriving from personal insecurities and fear of embarrassment are largely
circumvented, since critical comments are directed at the concept map, not at the person(s)
building the map. Having learners comment on each other’s concept maps, whether they
are in the same classroom or in different schools, is an effective form of peer-review and
collaboration.

The extensive support that CmapTools provides for the collaborative construction of
concept maps by groups, whether they are at the same location or in distant locations, has
couraged the increasing use of collaboration during map building. In a variety of
educational settings, concept mapping in small groups has served us well in tasks as
diverse as understanding ideas in assimilation learning theory to clarifying job conflicts for
conflict resolution in profit and non-profit corporations (e.g., Beirute & Mayorga, 2004).
Concept maps are now beginning to be used in corporations to help teams clarify and
articulate the knowledge needed to solve problems ranging from the design of new
products to marketing to administrative problem resolution.

A New Model for Education

A Concept Map-Centered Learning Environment

CmapTools provides a variety of features that make it possible for teachers to use concept
maps for a variety of the tasks that students perform (Cañas & Novak, 2005). In addition to
a network environment that fosters collaboration and the possibility of constructing
knowledge models, the software allows users, among other features, to (a) search for
information based on a concept map (Carvalho et al., 2001), by which a student can use the
Cmap to research information to learn more about the topic, leading to an improved map
with linked resources, and iteratively proceed on another search; (b) record the process of
constructing a Cmap for later playback, providing support to the teacher in what is
considered to be a key aspect of concept mapping: the process of constructing a map; (c) piece-wise display a concept map and associated resources full-screen for oral presentations; (d) graphically compare two Cmaps, allowing the teacher to compare the student’s map to his/hers for an initial evaluation. The concept map can thus become an artifact around which the various activities of the learning process can be centered, as shown in Figure 8.

Based on the features provided by CmapTools, the student can use the concept map prepared as a pre-test as an initial step towards learning the pieces of knowledge that he/she needs to better understand, as the basis on which to perform the research that leads to this understanding, as a way to organize the various sources from which the student will construct this understanding, as the artifact with which to collaborate with peers, and as the means to present his/her findings at the end of the unit. Furthermore, the concept maps constructed by the student can become the foundation for a portfolio evaluation (see Vitale & Romance, 2000) of his/her performance.

**Focus Question, Parking Lots and Expert Skeleton Maps**

A concept map-centered learning environment implies that concept maps are used throughout the development of a learning unit or module. Concept maps within this
environment are likely to be used as the mechanism to determine the level of understanding students have about the topic being studied before the topic is introduced. The maps are then developed, extended and refined as the students develop other activities on the topic and increase their understanding, possibly concluding with complex knowledge models that link resources, results, experiments, etc., and that can be used if desired as a final presentation by the students.

Just as there are many possible uses of concept maps within the classroom activities, there are a variety of “starting points” for the construction of the initial concept maps by students.

Each student can construct the initial concept map individually, giving the teacher feedback on the level of understanding of every student. Within the option of individual construction of the map, the students can be allowed to collaborate through a Knowledge Soup (Cañas et al., 1995; Cañas et al., 2001), where students are able to share propositions but not see each other’s maps (see Figure 9). The concept map can be constructed by students working in couples or small groups, where the teacher must pay attention to the level of participation of every student. CmapTools has a recorder feature that allows recording and playback of steps in map construction, including identifications of each contributor.

Figure 9. Concept map that is part of a collaborative Knowledge Soup. The list of propositions on the top right window are automatically derived from the Cmap, and those with a “pin” have been “published”. The lower right window shows propositions from other participants in Soup, some of which have discussion threads attached questioning or commenting on the proposition.
The concept map can also be a class effort, using a projector, where all students give their opinion and participate in the construction of the map. Teachers must be alert to evaluate the individual participation of every student.

Likewise, the starting point from which the map is constructed can vary depending on the expected previous understanding by the students, the difficulty and novelty of the topic, and the teacher’s confidence in mastering the topic.

**Focus Question**

The starting point for constructing a concept map can consist of only the *focus question*. For example, “How do we measure time?” can be given to the students as the question to answer through the construction of the concept map. The type of focus question makes a difference in the type of concept maps that the student builds. A question like “What are plants?” will lead to a declarative, more classificatory concept map than the question “Why do we need plants?” Experiments show that not only the focus question, but also the root concept of a concept map have a strong influence on the quality of the resulting concept map (Derbentseva *et al.*, 2004, 2006). It is important that a question be given and not just a

![Figure 10. The beginning of a concept map with a focus question and a parking lot with concepts to be included in the map.](image)
topic (e.g., “make a concept map about plants”), since answering the question helps the students focus on their maps. Whenever a concept map is made with CmapTools and then saved, the maker is asked to provide a focus question, as well as key concepts for this concept map.

**Parking Lot**

We refer to a list of concept waiting to be added to a concept map as the *parking lot* of concepts. The starting point for the construction of the concept map can be a list of concepts that the teacher wants to make sure all students include in their map. An example of this was given in Figure 6 above. Figure 10 presents the focus question and parking lot for the focus question “What is the structure of the Universe?” The student, group of students, or class is expected to build a concept map that answers the question and includes at least the concepts in the list. Experienced concept mappers agree with researchers that the most challenging and difficult aspect of constructing a concept map is constructing the propositions; that is, determining what linking phrases will clearly depict the relationship between concepts. So giving the student some of the concepts does not take away from the difficulty in the map construction, although it may somewhat limit the creativity of the student in selecting the concepts to include. It does provide the teacher with insight into which concepts the student(s) had trouble integrating into the concept map, indicating little or no understanding of these concepts.

**Expert Skeleton Maps**

For difficult topics – whether difficult for the students as determined by the teacher’s previous experience, or difficult for the teacher because of his/her background – using an “expert skeleton” concept map is an alternative. An “expert skeleton” concept map has been previously prepared by an expert on the topic, and permits both students and teachers to build their knowledge on a solid foundation. “Expert skeleton” concept maps serve as a guide or scaffold or aid to learning in a way analogous to the use of scaffolding in constructing or refurbishing a building.

Figure 11 is an “expert skeleton” concept map that corresponds to the same topic as the “parking lot” in Figure 10. Observe that in this example, some of the concepts were left in the “parking lot” for the student to add to the concept map.

The use of “expert skeleton” concept maps is a research topic we are pursuing, and for which we don’t have as much experience as with the focus question and parking lot starting points. O’Donnell, Dansereau, & Hall (2002) have shown that “knowledge maps” can act as scaffolds to facilitate learning.

It is important to note that the “expert skeleton” concept maps should be built by an expert on the topic. The intention is that the expert will be better at selecting the small number of
concepts that are key to understanding the topic, and express accurately the relationships between these concepts. In general, it is much more difficult to build a good, accurate concept map about a topic with a small number of concepts (e.g., four or five) than with fifteen to twenty concepts.

There is no predetermined size that an “expert skeleton” concept map should have. But the expected final number of concepts in the map is a function of the number of concepts in the “skeleton”. For example, a “skeleton map” that consists of five concepts should be expanded by the student to a map with 15 to 20 concepts. If the “skeleton” map contains 20

Figure 11. An expert skeleton concept map dealing with a key concept that needs to be understood as a foundation for learning science, based on the parking lot from Figure 10. Some concepts were left in the parking lot for the student to add to the Cmap.
concepts, which makes it more of a complete map, the final map could be expected to contain about 50 to 60 concepts. In this case, we are probably referring to using a relatively complete (not skeleton) map as a scaffold, expecting students to go deeper into the topic by creating several submaps that are linked to the starting point map.

We foresee a program of using “expert skeleton” maps to scaffold learning beginning with the development of a series of concept maps in a discipline, starting with the most general, most inclusive ideas and then gradually moving to more specific concept maps that will guide the learners. For example, Figure 11 shows a “expert skeleton” concept map for the sciences that encompasses key major concepts needed to understand science. Learners can begin with such a map, add concepts from the parking lot, link digital resources and also construct more specific submaps. More specific expert concept maps can also be provided, such as that shown in Figure 12. Here we also see a submap that might be created by a group of learners, and a sample of two resources that could be accessed via icons on the submap.
One of the advantages in using CmapTools for scaffolding learning is the search function mentioned above, which permits access to WWW resources that are screened to fit the context of meanings defined by the concept map (Carvalho et al., 2001; Leake et al., 2004). Thus if one clicks on a concept such as “electrical energy” in Figure 12 and selects one of the “search” menu options, CmapTools will retrieve WWW resources that not only deal with electricity, but also relate to other concepts in the map. The program tries to figure out what the Cmap is about and prepare a query for Web search engines that will generate results that are relevant to the ideas being developed in the concept map. Of course, the learner still needs to select new concepts from the material and construct new propositions on the concept map that add meanings and clarity to the map. Thus, the learner or team of learners is very actively engaged in the meaning building process, an essential requirement for meaningful learning to occur.

Learners can also engage in laboratory or field studies that will add important concrete experiences needed for developing fuller meanings to concepts, and sometimes the excitement that comes with discovering new ideas or relationships.

The extent of materials and ideas that can be built into knowledge structures using “expert skeleton” concept maps, CmapTools, and WWW resources far surpass what any textbook or any teacher could provide. In fact, teachers supervising this kind of study are likely to learn as many new things as their students. Moreover, beginning with the “expert skeleton” maps as starting points reduces the chance that misconceptions or faulty ideas held by learners or teachers will be reinforced and maximize the chance that they will build knowledge structures that in time remove or diminish misconceptions (Novak, 2002).

**The World of Science Project**

In 1966, Bobbs-Merrill published an elementary science textbook series, *The World of Science*, written largely by Novak with the objective of introducing basic science concepts to elementary school students and teachers. Unlike most elementary science textbooks, this series presents in-depth instruction in basic concepts at all grade levels, including instruction in concepts dealing with the nature of science, nature of matter, energy and energy transformations. The books have been scanned and a DVD of all six books is available. Our plan is to use *The World of Science* books as a starting point for a demonstration project for A New Model for Education. To begin, “expert skeleton” concept maps have been prepared for some sections of the grade two book and the whole of the grade four book of the World of Science entitled *The Expanding World of Science*. All of these concept maps are publicly available on the CmapTools Network. The “expert skeleton” concept maps would serve as a starting point for students and teachers for each section illustrated in the book, and then students would use these Cmaps together with...

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2 Go to [http://cmapdp.ihmc.us](http://cmapdp.ihmc.us), Click on IHMC – Internal - 2, The World of Science folder.
CmapTools to search the WWW for pertinent resources and ideas. Figure 13 illustrates one of the “expert skeleton” concept maps that could be used as the starting point for building a knowledge model, preferably students working in teams and sharing ideas.

The science books provide relevant readings and suggested activities. It would be important for the teacher to help students perform these activities, and similar related activities, some of which might by suggested in WWW resources. Learners would also add their own concepts to the “expert skeleton” concept map, as well as resources identified in readings and from the Internet. Figure 14 illustrates a stage in this process.

Obviously, it would be a very deficient science program that did nothing more than have students copy and do some building on the “expert skeleton” concept maps provided for grade two, or for any other grade. Students need concrete, hands on experiences with real things and to observe real phenomena to put meaning into the concept labels provided in the concept maps and other resources.

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3 *The World of Science* books were published in 1966 and some of the figures are dated.
A pilot program effort is already in progress in Italy, where Giuseppe Valittuti (2004) and his colleagues are now working to translate The World of Science books into Italian. Valittuti and his colleagues have obtained funding from the Italian Ministry of Education for teacher training and a number of elementary school teams began working with the World of Science concept maps and other resources during the 2005-2006 year. The plan is to have four sets of schools focus on different aspects of The World of Science series and produce photos and videos of students doing projects that illustrate and utilize the various science concepts. There will be much feedback from classrooms helping the teams to refine their work, sharing “electronic portfolios” using CmapTools. This feedback should help us to rapidly refine concept maps, techniques and approaches for improving practice of the New Model for Education. The CmapTools Network may serve as a clearinghouse for some of these efforts through its Public servers in Italy and other countries. We anticipate that an abundance of both anecdotal and empirical data will flow from these efforts in a few years. Based on the solid theoretical and related research findings now available, there is every reason to be optimistic that these innovative efforts will be successful. Progress of this project can be followed at: www.leparoledellascienza.it.

Figure 14. Schema showing the New Model for Education with concepts and resources added to the “expert skeleton” concept map, plus a page from a World of Science book providing relevant reading and activities.
Problems of Implementation

The greatest challenge we may expect is to change the school situational factors in the direction of teacher as coach and learner from the prevailing model of teachers as disseminator of information. We know that we need to engage teachers and administrators in training programs that can model the new educational approaches, and we need to seek their counsel on ways to improve on the New Model for Education. There is also the challenge of changing assessment practices that now rely primarily on multiple-choice tests that measure mainly rote recall of information, to performance-based tests that require students to demonstrate that they understand basic concepts and can use these concepts in novel problems solving, and that they can use Internet resources to grow and modify their concepts and learn new concepts. There remains in the New Model plenty of room for acquisition of specific facts and procedures, but now these should be learned within the context of powerful conceptual frameworks. Research (Bransford et al., 1999) has shown that factual information acquired in a context of meaningful learning is not only retained longer, but this information can be used much more successfully to solve new problems.

We might expect some opposition to implementation of the New Model of Education from individuals who believe that “inquiry” learning is the only way to improve education. In fact, research overwhelmingly supports the value of “guided inquiry”, such as that involved in A New Model for Education (Mayer, 2004; Kirschner et al., 2006, Sweller, et al., 2007).

There is an enormous job of teacher education that needs to be done before the New Model can be implemented in schools. Teachers need to become familiar with the use of CmapTools software and the various tools it contains. They also need to learn about the theory underlying concept mapping, including the ideas in this paper. Teacher education programs should model the kind of learning we are recommending, and we might use as “expert skeleton” concept maps some of the concept maps available from Novak’s (1998) book accessible at the “IHMC Internal” CmapTools Place, under the folder “Joe Novak’s/JNsLCUBook”. Teachers should work collaboratively to build on some of the simpler concept maps dealing with education ideas and perhaps add resources to some of the more complex concept maps. Even with the current state of technology and pedagogical understandings, it is possible for schools, states or countries to mount a New Model for Education.

Concept Maps for Evaluation

We are now beginning to see in many science textbooks the inclusion of concept mapping as one way to summarize understandings acquired by students after they study a unit or chapter. Change in school practices is always slow, but it is likely that the use of concept
maps in school instruction will increase substantially in the next decade or two. Practices for assessing student understanding of subject matter are also available (Mintzes et al., 2000). When concept maps are used in instruction, they can also be used for evaluation. There is nothing written in stone that says multiple choice tests must be used from grade school through university, and perhaps in time even national achievement exams will utilize concept mapping as a powerful evaluation tool. This is a chicken-and-egg problem because

Figure 15. A concept map prepared cooperatively by the faculty of the College of Veterinary Medicine at Cornell University to show the over-all structure for a revised curriculum.
Concept Maps and Curriculum Planning

In curriculum planning, concept maps can be enormously useful. They present in a highly concise manner the key concepts and principles to be taught. The hierarchical organization of concept maps suggests more optimal sequencing of instructional material. Since the fundamental characteristic of meaningful learning is integration of new knowledge with the learners’ previous concept and propositional frameworks, proceeding from the more general, more inclusive concepts to the more specific information usually serves to encourage and enhance meaningful learning. Thus, in curriculum planning, we need to construct a global “macro map” showing the major ideas we plan to present in the whole course, or in a whole curriculum, and also more specific “micro maps” to show the knowledge structure for a very specific segment of the instructional program. Faculty working independently or collaboratively can redesign course syllabi or an entire curriculum. For example, faculty working together to plan instruction in veterinary medicine at Cornell University constructed the concept map shown in Figure 15.

Using concept maps in planning a curriculum or instruction on a specific topic helps to make the instruction “conceptually transparent” to students. Many students have difficulty identifying the important concepts in a text, lecture or other form of presentation. Part of the problem stems from a pattern of learning that simply requires memorization of information, and no evaluation of the information is required. Such students fail to construct powerful concept and propositional frameworks, leading them to see learning as a blur of myriad facts, dates, names, equations, or procedural rules to be memorized. For these students, the subject matter of most disciplines, and especially science, mathematics, and history, is a cacophony of information to memorize, and they usually find this boring. Many feel they cannot master knowledge in the field. If concept maps are used in planning instruction and students are required to construct concept maps as they are learning, previously unsuccessful students can become successful in making sense out of science and

**Capturing and Archiving Expert Knowledge**

One of the uses of concept maps that is growing at a fast rate is the use of concept maps to capture the “tacit” knowledge of experts. Experts know many things that they often cannot articulate well to others. This tacit knowledge is acquired over years of experience and derives in part from activities of the expert that involve thinking, feeling and acting. Often experts speak of a need to “get a feeling for what you’re working on”. In fact, the biography of one Nobel Lauriat in biology (Barbara McClintock) was entitled, *A Feeling for the Organism* (Keller, 1983). Nonaka and Takeuchi (1995) stress the importance of capturing and using the knowledge of corporate expert’s tacit knowledge if a company wants to become “the knowledge creating company”.

Most of the methods used prior to concept maps consisted of various forms of interviews and analyses with experts, including case studies of how experts accomplished some remarkable achievement (Hoffman *et al.*, 1995; Klein & Hoffman, 1992). In fact, these methods continue to be highly popular with many cognitive scientists, most of whom are unfamiliar with Ausubel’s work and the kind of epistemological ideas on which concept mapping is based. In a review of the table of contents for 20 recent books on cognitive science, not one included “epistemology” in its index. We also used “clinical interviews” in our early work, as noted above, but we found it necessary to invent a better way to represent what our learners knew and how their knowledge was changing over time. At IHMC, we began using interviews to identify expert knowledge needed to interpret computer readings from computer outputs of a machine designed to assess problems with heart functions, following the injection of a bolus of radioactive solution, and to diagnose coronary dysfunction (Ford *et al.*, 1991; Ford *et al.*, 1996). However, when we began to concept map the expert knowledge of a cardiologist who literally “wrote the book” on this technology, it was evident that there were concepts missing in the map and that the “tacit knowledge” of our expert was not fully expressed in his book or in our interviews. Thus, the concept map not only allowed us to represent the expert’s knowledge, but also to find gaps in the knowledge structure we were procuring through interviews.

While we expect that interviews, case study analyses, “critical incident” analyses and similar techniques will have value in extracting and representing expert knowledge, it is likely that the end product of these studies might still be best represented in the form of concept maps, perhaps with some of the interview data and other information presented through icons on maps.
At IHMC we continue to be very active in the area of capturing and representing expert

Figure 16. A “Home” concept map for the knowledge portfolio created by NASA for Mars Exploration.

Figure 17. An example of a concept map that can be accessed via clicking on one of the resources attached to a concept on Figure 16.
knowledge (Coffey et al., 2002). As the CmapTools software has evolved, it has become an increasingly useful tool for this work, as illustrated by the remarkable resources on Mars prepared at NASA Ames’ Center for Mars Exploration (Briggs et al., 2004). Figure 16 shows a “Home” concept map for the knowledge portfolio that Briggs created and Figure 17 shows one of the many submaps he created. The entire set of concept maps can be viewed at: http://cmex.ihmc.us. In addition to submaps, a wide variety of digital resources can be accessed via the concept maps. Many other projects are represented in the IHMC Public CmapServer accessible through CmapTools, including projects dealing with weather forecasting (Hoffman et al., 2000, see: http://www.ihmc.us/research/projects/StormLK/), electronic technicians (Coffey et al., 2003), and Thai fabric crafts.

Conclusions

In this paper we have tried to present the theoretical foundations and the origins of what we call concept maps. While at first glance concept maps may appear to be just another graphic representation of information, understanding the foundations for this tool and its proper use will lead the user to see that this is truly a profound and powerful tool. It may at first look like a simple arrangement of words into a hierarchy, but when care is used in organizing the concepts represented by the words, and the propositions or ideas are formed with well-chosen linking words, one begins to see that a good concept map is at once simple, but also elegantly complex with profound meanings. Concept mapping has been shown to help learners learn, researchers create new knowledge, administrators to better structure and manage organizations, writers to write, and evaluators assess learning. As with any tool, it can also be misused, and we have illustrated some examples of this.

We also wish to use this document as a foundation for further experimentation, critique, and dialogue regarding the use of this tool. The CmapTools web site provides opportunities for lively exchanges among users and researchers. This document itself should be a “living” document, with revisions occurring periodically as we gain new knowledge and experiences with the use of this tool. We invite all users of concept mapping and CmapTools to participate in this dialogue.

References


How does psychodynamic psychotherapy work?
Kirsty Passmore and Wai-Ching Leung explain what is involved in this form of "talk therapy" and why you should know about it. (Education)

Student BMJ, February 2002
Psychoanalysis never ceases to fascinate people, particularly in America where there is a great demand for therapy. In traditional psychoanalysis, patients attend between twice to five times a week. As this is rarely feasible in the NHS, a similar though less intensive form of therapy, "psychodynamic psychotherapy," is usually offered. Students almost never have the opportunity to observe psychodynamic psychotherapy in action, as observers are never allowed. However, as future doctors, it is important to have a basic understanding of how it works and to be able to make appropriate referrals.

There are many types of psychotherapies ("talking therapies"). At one extreme, some focus entirely on what we do and not what we feel-for example, behavioural therapy. Other therapies focus on what and how we think-for example, cognitive therapy. By contrast, psychodynamic psychotherapy focuses on how we feel and how our mind works. Although we sometimes jokingly claim to have analysed our friends, we know that we can do nothing of the sort.

Although psychodynamic psychotherapy is one of the commonest types of psychotherapy used in the NHS, it is important to remember that this is only one of many types of psychotherapy available (see box 1). Both of us received supervision in giving psychodynamic psychotherapy during our psychiatric training, but we are not experts in psychotherapy. However, we found psychodynamic psychotherapy interesting, and hope to explain the basic ideas behind this type of therapy in simple terms.

How the mind works

Psychodynamic psychotherapists view the mind at three different levels: the conscious, the preconscious, and the unconscious. The "conscious" includes everything that you are aware of. The preconscious contains emotions and knowledge that we are not aware of at this moment, but are easily accessible. However, some of our past childhood experiences and desires may be too painful and threatening even to acknowledge to ourselves. Our mind copes by pushing (or "repressing") them out of our "conscious" into our "unconscious" and makes sure that they are kept there. For example, a victim of childhood abuse may repress the painful memories. This is one example of our inborn psychological mechanisms ("defence mechanisms") which protect us from being aware of these anxiety provoking themes. Another example is a woman with breast cancer who uses denial to cope with the news. In these examples, these mechanisms certainly do us some good, as otherwise we may be completely psychologically overwhelmed. We are not aware of these mechanisms at the time.

Although our mind keeps this threatening material almost permanently out of our "conscious," it may nevertheless come back to haunt us. For example, we might find it difficult to establish relationships as adults or experience neurotic symptoms, such as anxiety and depression. If we want to get rid of these symptoms and live a more fulfilling life it may be beneficial to uncover this material in our "unconscious" and understand how our childhood experience has affected us. This is the purpose of psychodynamic psychotherapy.
The material in our unconscious is unlikely to be revealed if we are actively focusing on the more serious or threatening issues. There are at least four situations under which we are more likely to reveal such material—hypnosis, sedation, dreaming, or "free association." Hypnosis and mild sedation by sodium amytal were used in the past, but few psychoanalysts would employ such techniques nowadays, particularly with the controversies surrounding potential false memories of past sexual abuse. According to Freud, dreams may represent unconscious wishes or fears and may be interpreted by the therapist. Free association—that is, saying whatever comes to our mind—may encourage unconscious material to emerge, as in "Freudian slips of the tongue." Analysis of dreams and free association are most commonly used nowadays.

**Psychodynamic psychotherapy in action**

**The practical arrangements**

The length of therapy varies and is usually agreed at the outset, but long term therapy usually lasts for at least one year. Sessions are usually about 50 minutes long and are held at the same time and place each week.

During the sessions the patient is encouraged to talk about whatever comes to mind while the therapist listens without encouragement, intrusion, or giving advice. The patients may express strange or shameful ideas that suddenly enter their mind. If the patients have problems doing this it may mean that they still have strong defence mechanisms.

The therapist may also encourage patients to discuss recent dreams. The therapist recognises symbols in the dreams, interprets them to the patient, and further refines the interpretations according to the patient's responses.

**How psychodynamic psychotherapy works**

After the therapist gets a feel of the unconscious anxieties and conflicts that the patient currently experiences, he or she then works out the defence mechanisms that the patient uses to minimise such conflicts as well as the underlying cause for these anxieties and conflicts. In order to enable the patient to gain insight into the underlying cause, the therapist must first interpret the defence mechanisms used, followed by the anxiety the patient is unconsciously avoiding (see figure 1). However, in order to help the patient to gain real insight into these problems, it is important for the patient to re-experience the same conflict in therapy.

The therapist may also point out and explore similarities in the patient's feelings and behaviour towards current important relationships and towards the therapist. The patient's understanding of the links between these three elements—past important relationships (P), current significant relationships (C), and relationship with the therapist—that is, transference (1)—will help the patient to gain deeper insight into the real anxieties and conflicts and their underlying causes (see figure 2). We will illustrate this in the case history.

Although the patient often reveals very personal details during psychoanalysis, the therapists traditionally reveal little about themselves so that they may act as a "blank screen," though many therapists relax this rule nowadays in order to build a more positive relationship. The purpose is to encourage the patient to imagine what the therapist is really like by using their knowledge of previous relationships with important childhood figures such as their parents. The patient may unintentionally behave towards or have certain feelings for the therapist due to these previous relationships. This transfer of feelings from previous important childhood figures to the therapist is called "transference." If the therapist suggests such a hypothesis -- that is, interpretation -- it may be supported
by further material elaborated from the patient. In this case, the patient may be helped to recognise and deal with these unresolved feelings.

Potential problems

However, the therapist also has feelings. The therapist may transfer his or her feelings originating from outside the therapy room to the patient. This is called countertransference. To minimise such risks, the therapist often undergoes therapy with another experienced therapist acting as supervisor. Patients with previous experience of rejection might perceive the end of therapy as another rejection. It is indeed not uncommon for a patient's psychological state to deteriorate towards the end of the therapy. Therefore, the termination of therapy needs to be prepared for well in advance.

Conclusion

Although psychoanalysis is based on elaborate theories, it is difficult to know for sure whether psychodynamic psychotherapy actually does any good. While a systematic review recently showed that cognitive therapy is beneficial for a certain group of patients, such robust scientific evidence for psychodynamic psychotherapy is lacking.

There are several difficulties in evaluating psychodynamic psychotherapy. It is difficult to know exactly what outcomes to measure; the benefits might not occur for many years; and it is difficult to exclude placebo effects. Experiences during therapy are highly subjective for both the patient and therapist. Psychoanalytic therapies can be highly successful and satisfying to both patients and therapists, but they can also prove disastrous if badly handled.

A hypothetical illustrative case history

Jane, a 25 year old medical student in her second year, was referred for psychoanalytic therapy after presenting with episodes of depression that had seriously affected her study.

In the first five sessions, the therapist encouraged Jane to talk about anything which came into her mind, but especially about events in her life leading to her depression. Jane began by expressing her extreme guilt about her lack of efforts during her medical studies. She talked about her boyfriend in Ireland, John, whom she had known for over eight years. She chose to leave Ireland to study in England two years ago, although she could have studied in Ireland and she knew that John would not leave Ireland because of family connections and his job. She thought that John had another girlfriend and felt guilty about leaving Ireland in the first place. The therapist tentatively suggested that Jane left Ireland because she was afraid that something might occur between her and John. Jane followed this up by mentioning that one of her fellow students, Mary, was very upset last month after her boyfriend left her for another woman. The therapist then suggested that Jane left Ireland probably because she was afraid of being abandoned by John.

In the next six sessions, Jane talked about her childhood. At the age of 4, she was very close to her father. However, he left for work one morning, but did not return home for almost three years. Her mother never gave her any explanations, although she learnt several years later that he had gone off to live with another woman. The therapist then made the connection of this experience with her decision to leave Ireland last year in order to
avoid the same experience of being abandoned by her father—that is, C/P link (see figure 2). Jane then recounted another episode at the age of 10 when her father left her for two years due to work commitments abroad. Jane seemed to be much happier in the following session.

The therapist cancelled the next four sessions as she had to attend an international conference abroad. In the two sessions on her return, Jane talked generally and superficially, and cancelled the following two sessions apparently due to pressure of assignments. In the next session, Jane repeatedly apologised for cancelling the previous sessions, but continued to talk superficially. The therapist suggested that Jane felt angry with her because she had to cancel the previous sessions, and hinted that Jane cancelled the last two sessions so as to avoid being abandoned by the therapist—that is, P/T and C/T links (see figure 2).

In the next sessions, Jane described a recent vivid and frightening dream in which she argued with and became hostile to an elderly woman she met in the street. She woke up frightened when the "elderly woman" took off her mask and she saw that "she" was her father. The therapist interpreted the aggression she felt towards her father for abandoning her in the past and the guilt for this aggressive impulse. The following 10 sessions were then spent on working through and ventilating the resentment. The therapist then prepared for the ending of the therapy, anticipating that the termination might bring out the feelings of experience of being abandoned in childhood. In spite of some ups and downs, Jane coped with the termination after a year in therapy. She caught up with her medical studies, her relationship with John strengthened, and her feelings of guilt disappeared.

Comments on the case history

The therapist first pointed out that Jane decided to leave Ireland—that is, defence mechanism of avoidance—because she wanted subconsciously to minimise the anxiety of being abandoned by her boyfriend. It was only after some time in therapy that the real underlying cause for this anxiety—that is, childhood experience of being abandoned by her father—came to light and her unconscious feelings of aggression and anger towards her father surfaced. By pointing out the similarities of Jane's feelings towards her father, her boyfriend, and the therapist, as well as re-experiencing the emotions in her patient-therapist relationship, the therapist helped Jane to gain deeper insight into her emotional conflicts.

RELATED ARTICLE: Box 1: Some other types of psychotherapy

Psychotherapy—any psychological treatment, "talking therapy"

Psychoanalysis—the most intensive and prolonged form of long term psychotherapy based on theories of motivations underlying human behaviour

Brief psychodynamic psychotherapy—psychological treatment using similar tools as psychoanalysis but of a short duration

Humanistic psychotherapy concerned with higher human motives self development, and understanding for example, client centred therapy

Client centred therapy—non directive, non judgmental and reflective therapy One form of humanistic psychotherapy
Supportive psychotherapy--less intensive therapy used to relieve distress or help the patient cope with ongoing difficulties

Interpersonal therapy--a structured type of therapy for problems in relation to personal roles and interpersonal relationships useful in depression

Cognitive therapy--focuses on how we interpret our experiences and tries to change maladaptive ways of thinking--for example inappropriate automatic negative thoughts

Cognitive analytic therapy--applies cognitive therapy techniques within a framework of psychoanalytic understanding

Box 2: Glossary

Defence mechanisms--unconscious psychological processes that protect against painful memories, feelings, etc

Transference--patient transferring feelings towards other persons to the therapist

Counter transference--therapist transferring feelings towards other persons to the patient

Repression--the exclusion of distressing thoughts or feelings from consciousness

Interpretation--sharing with the patient how the therapist would make sense of the significance and symbolic meaning of the patient's statement or behaviour

Dream interpretation--the therapist's interpretation of symbols in a dream to the patient

Free association--patient is encouraged to talk freely about whatever comes to mind

Resistance--the avoidance of certain topics and rejection of the therapists interpretations

C/P link--making connections between similarities in feelings towards current (or recent past) and past important relationships

P/T link--making connections between similarities in feelings towards past important relationships and the therapist

C/T link--making connections between similarities in feelings towards current (or recent past) relationships and the therapist.


Dr. Sigmund Freud (1856-1939) Austrian. Treated patients with neuroses. Became good friends with Carl Gustav Jung when they met in 1906. Went on to publish numerous books and develop theories behind dream interpretation. Famous for relating sexual habits and functions to personality development.

Dr. Carl Gustav Jung (1875-1961) Lived in Switzerland and the USA. Qualified as a medical doctor and went on to invent the concept of word association. Was a great admirer of Sigmund Freud, though didn't entirely agree with his theories. Famously developed the personality theory of the Ego (conscious mind), the Personal Unconscious (things not normally conscious but which can surface, e.g. instincts) and the Collective Unconscious (inherited personality traits).

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IT'S NOT JUST ABOUT SALIVATING DOGS!


Have you ever walked into a dentist’s office where the odor of the disinfectant made your teeth hurt? If you have, it was probably because the odor triggered an association that had been conditioned in your brain between that smell and your past experiences at the dentist. When you hear "The Star Spangled Banner" played at the Olympic Games, does your heart beat a little faster? This happens to most Americans. Does the same thing happen when you hear the Italian national anthem? Unless you were raised in Italy, most likely it does not, because you have been conditioned to respond to one anthem, but not to the other. And why do some people squint and become nervous if you inflate a balloon near them? It is because they have been conditioned to associate the expanding balloon with something fearful (such as a loud pop). These are just a few of countless human behaviors that exist because of a process known as *classical conditioning*.

The classical conditioning theory of learning was developed and articulated nearly 100 years ago in Russia by one of the most familiar names in the history of psychology, Ivan Petrovich Pavlov (1849-1946). Unlike most of the research presented in this book, Pavlov’s name and his basic ideas of learning by association are widely recognized in popular culture (there is even a Rolling Stones song that referred to "salivatin' like Pavlov's dogs"). However, how he came to make his landmark discoveries and the true significance of his work are not so widely understood.

While Pavlov’s contribution to psychology was one of the most important ever made, he was not a psychologist at all, but rather a prominent Russian physiologist studying digestive processes. For his research on digestion he was awarded the Nobel Prize for science. But the discoveries that dramatically changed his career, and the history of psychology, began virtually by accident. It is important to note that in the late 1800s, psychology was a very young science and considered by many to be less than a true science. Therefore, Pavlov’s decision to make such a radical turn from the more solid and respected science of physiology to psychology was a risky career move. He wrote about the dilemma facing a physiologist whose work might involve studying the brain:

> It is logical that in its analysis of the various activities of living matter, physiology should base itself on the more advanced and more exact sciences, physics and chemistry. But if we attempt an approach from this science of psychology ... we shall be building our superstructure on a science that has no claim to exactness . . . . In fact, it is still open to discussion whether psychology is a natural science, or whether it can be regarded as a science at all. (p. 3)

Looking back on Pavlov’s discoveries, it was fortunate for the advancement of psychological science and for our understanding of human behavior that he took the risk and made the career change.

Pavlov’s physiological research involved the use of dogs as subjects for studying the role of salivation on digestion. He or his assistants would introduce various food or nonfood substances into a dog’s mouth and observe the rate and amount of salivation. In order to measure salivation scientifically, minor surgery was performed on the dogs so that a salivary duct was redirected through an incision in the dog’s cheek and connected to a tube that would collect the saliva. Throughout this research, Pavlov made many new and interesting discoveries. For example, he found that when a dog received moist food, only a small amount of saliva would be produced, compared with a heavy flow when dry food was presented. The production of saliva under these varying conditions was regarded by Pavlov as a reflex, that is, a response that occurs automatically to a specific stimulus without the need for any learning. If you think about it, salivation is purely reflexive for humans, too. Suppose I ask you, as you read this sentence, to salivate as heavily as you can. You cannot do it. But if you are hungry and find yourself sitting in front of your favorite food, you will salivate whether you want to or not!

So, Pavlov experimented with various stimuli to determine just how "intelligent" these salivary glands were. As the research continued, he began to notice certain events that were totally unexpected. The dogs began to salivate before any food reached their mouths and even before the odor of food was present. After a while, the dogs were salivating at times when no digestive stimulus was present at all. Somehow, the reflexive action of the salivary glands had been altered through the animals’ experience in the lab: "Even the vessel from which the food has been given is sufficient to evoke an alimentary reflex [of salivation] complete in all its details; and, further, the secretion may be provoked even by the sight of the person who has brought the vessel, or by the sound of his footsteps" (p. 13).
This was the crossroads for Pavlov. He had observed digestive responses occurring to stimuli seemingly unrelated to digestion, and pure physiology could not provide an explanation for this. The answer had to be found in psychology.

THEORETICAL PROPOSITIONS

Pavlov theorized that the dogs had learned from experience in the lab to expect food following the appearance of certain signals. While these signal stimuli do not naturally produce salivation, the dogs came to associate them with food, and thus responded to them with salivation. Consequently, Pavlov determined that there must be two kinds of reflexes.

Unconditioned reflexes are inborn and automatic, require no learning, and are generally the same for all members of a species. Salivating when food enters the mouth, jumping at the sound of a loud noise, and the dilation of your pupils in low light are examples of unconditioned reflexes. Conditioned reflexes, on the other hand, are acquired through experience or learning and may vary a great deal among individual members of a species. A dog salivating at the sound of footsteps, or you feeling pain in your teeth when you smell dental disinfectant, are conditioned reflexes.

Unconditioned reflexes are formed by an unconditioned stimulus (UCS) producing an unconditioned response (UCR). In Pavlov's studies, the UCS was food and the UCR was salivation. Conditioned reflexes consist of a conditioned stimulus (CS), such as the footsteps, producing a conditioned response (CR), salivation. You will notice that the response in both of these examples is salivation, but when the salivation results from hearing footsteps, it is conditioning that produced it.

The question Pavlov wanted to answer was this: Since conditioned reflexes are not inborn, exactly how are they acquired? He proposed that if a particular stimulus in the dog's environment was often present when the dog was fed, this stimulus would become associated in the dog's brain with food; it would signal the approaching food. Prior to being paired with the food, the environmental stimulus did not produce any important response. In other words, to the dogs, it was a neutral stimulus (NS). When the dogs first arrived at the lab, the assistant's footsteps might have produced a response of curiosity (Pavlov called it the "What is it?" response), but hearing the footsteps certainly would not have caused the dogs to salivate. The footsteps, then, were a neutral stimulus. However, over time, as the dogs heard the same footsteps just prior to being fed every day, they would begin to associate the sound with food. Eventually, according to the theory, the footsteps alone would cause the dogs to salivate. So, Pavlov proposed that the process by which a neutral stimulus becomes a conditioned stimulus could be diagrammed as follows:

<table>
<thead>
<tr>
<th>Step 1</th>
<th>UCS (food)</th>
<th>UCR (salivation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>NS (footsteps)</td>
<td>UCS (food)</td>
</tr>
<tr>
<td>Step 3</td>
<td>Repeat step 2 several times</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>CS (footsteps)</td>
<td>CR (salivation)</td>
</tr>
</tbody>
</table>

Now that he had a theory to explain his observations, Pavlov began a series of experiments to prove that it was correct. It is commonly believed that Pavlov conditioned dogs to salivate at the sound of a bell. But as you will see, his early experiments involved a metronome.

METHOD AND RESULTS

Pavlov was able to build a special laboratory at the Institute of Experimental Medicine in Petrograd (which became Leningrad and has now returned to its original name of St. Petersburg) with funds donated by "a keen and public-spirited Moscow businessman." This soundproof lab allowed for complete isolation of the subjects from the experimenters and from all extraneous stimuli during the experimental procedures. Therefore, a specific
stimulus could be administered and responses could be recorded without any direct contact between the experimenters and the animals.

After Pavlov had established this controlled research environment, the procedure was quite simple. Pavlov chose food as the unconditioned stimulus. As explained previously, food will elicit the unconditioned response of salivation. Then Pavlov needed to find a neutral stimulus that was, for the dogs, completely unrelated to food. For this he used the sound of the metronome. Over several conditioning trials, the dog was exposed to the ticking of the metronome and then was immediately presented with food. "A stimulus which was neutral of itself had been superimposed upon the action of the inborn alimentary reflex. We observed that, after several repetitions of the combined stimulation, the sounds of the metronome had acquired the property of stimulating salivary secretion" (p. 26). In other words, the metronome had become a conditioned stimulus for the conditioned response of salivation.

Pavlov and his associates elaborated on this preliminary finding by using different unconditioned and neutral stimuli. For example, they presented the odor of vanilla (NS) to the subjects prior to placing a lemon juice-like solution in the dog's mouth (the UCS). The juice caused heavy salivation (UCR). After 20 repetitions of the pairing, the vanilla alone produced salivation. For a visual test, the dogs were exposed to an object that began to rotate just prior to the presentation of food. After only five pairings, the rotating object by itself (CS) caused the dogs to salivate (CR).

The importance and application of Pavlov's work extends far beyond salivating dogs. His theories of classical conditioning explained a major portion of human behavior and helped to launch psychology as a true science.

SIGNIFICANCE OF THE FINDINGS

The theory of classical conditioning (also called Pavlovian conditioning) is universally accepted and has remained virtually unchanged since its conception through Pavlov's work. It is used to explain and interpret a wide range of human behavior, including where phobias come from, why you dislike certain foods, the source of your emotions, how advertising works, why you feel anxiety before a job interview or an exam, and what arouses you sexually. Several later studies dealing with some of these applications are discussed here.

Classical conditioning focuses on reflexive behavior: those behaviors that are not under your voluntary control. Any reflex can be conditioned to occur to a previously neutral stimulus. You can be classically conditioned so that your left eye blinks when you hear a doorbell, your heart rate increases at the sight of a flashing blue light, or you experience sexual arousal when you eat strawberries. The doorbell, blue light, and strawberries were all neutral in relation to the conditioned responses until they somehow became associated with unconditioned stimuli for eye blinking (i.e., a puff of air into the eye), heart rate increase (i.e., a sudden loud noise), and sexual arousal (i.e., romantic caresses).

To experience firsthand the process of classical conditioning, here is an experiment you can perform on yourself. All you will need is a bell, a mirror, and a room that becomes completely dark when the light is switched off, to serve as your temporary laboratory. The pupils of your eyes dilate and constrict reflexively according to changes in light intensity. You have no voluntary control over this, and you did not have to learn how to do it. If I say to you, "Please dilate your pupils now," you would be unable to do so. However, when you walk into a dark theater, they dilate immediately. Therefore, a decrease in light would be considered an unconditioned stimulus for pupil dilation, the unconditioned response. In your lab, ring the bell and immediately after, turn off the light. Wait in the total darkness about 15 seconds and turn the light back on. Wait another 15 seconds and repeat the procedure: bell ... light off ... wait 15 seconds ... light on .... Repeat this pairing of the neutral stimulus (the bell) with the unconditioned stimulus (the darkness) 10 to 20 times, making sure that the bell only rings just prior to the sudden darkness. Now, with the lights on, watch your eyes closely in the mirror, and ring the bell. You will see your pupils dilate slightly even though there is no change in light! The bell has become the conditioned stimulus and pupil dilation the conditioned response.

RELATED RESEARCH AND RECENT APPLICATIONS

Two other studies presented in this book, rest directly on Pavlov's theory of classical conditioning. In the next article, John B. Watson conditioned 11-month-old little Albert to fear a white rat (and other furry things) by employing the same principles Pavlov used to condition salivation in dogs. By doing so, Watson demonstrated how emotions, such as fear, are formed. Later, Joseph Wolpe developed a therapeutic technique for treating intense fears (phobias) by applying the concepts of classical conditioning. His work was based on the idea that
the association between the conditioned stimulus and the unconditioned stimulus must be broken in order to reduce the fearful response.

This line of research on classical conditioning and phobias continues to the present. For example, studies have found that children whose parents have phobias may develop the same phobias to objects such as snakes and spiders through "vicarious" conditioning from mom and dad without any direct exposure to the feared object (Fredrikson, Annas, & Wik, 1997). Moreover, Pavlov's discoveries continue to be used to treat phobias in adults and children alike (e.g., King et al., 2000).

The countless applications of Pavlov's theory in the psychological and medical literature are far too numerous to summarize in any detail here. Instead, a few additional examples of the more notable findings are discussed.

A common problem that plagues ranchers around the world is that of predatory animals, usually wolves and coyotes, killing and eating their livestock. In the early 1970s, studies were conducted that attempted to apply Pavlovian conditioning techniques to solve the problem of the killing of sheep by coyotes and wolves without the need for killing the predators (see Gustafson et al., 1974). Wolves and coyotes were given pieces of mutton containing small amounts of lithium chloride (UCS), a chemical that if ingested makes an animal sick. When the animals ate the meat, they became dizzy, with severe nausea and vomiting (UCR). After recovering, these same hungry predators were placed in a pen with live sheep. The wolves and coyotes began to attack the sheep (CS), but as soon as they smelled their prey, they stopped and stayed as far away from the sheep as possible. When the gate to the pen was opened, the wolves and coyotes actually ran away from the sheep! Based on this and other related research, ranchers commonly use this method of classical conditioning to keep wolves and coyotes away from their herds.

A potentially vital area of research involving classical conditioning is in the field of behavioral medicine. Studies have indicated that the activity of the immune system can be altered using Pavlovian principles. Ader and Cohen (1985) gave mice water flavored with saccharine (mice love this water). They then paired the saccharine water with an injection of a drug that weakened the immune system of the mice. Later, when these conditioned mice were given the saccharine water but no injection, they showed signs of immunosuppression, a weakening of the immune response. Research is underway to study if the reverse is also possible, if immune enhancing responses may be classically conditioned. Overall, research is demonstrating that classical conditioning may indeed hold great promise for increasing the effectiveness of immune system responses in humans (Miller & Cohen, 2001). Just imagine: one day soon, you may be able to strengthen your resistance to illness by exposing yourself to a nonmedical conditioned stimulus. For example, imagine you feel the beginnings of a cold or the flu, so you slide your special classically conditioned "immune response enhancement music disk" into your CD player. As the music fills the room, your resistance rises as a conditioned response to this stimulus and stops the disease in its tracks.

As a demonstration of the continuing impact of Pavlov's discoveries on today's psychological research, consider the following. Since the previous edition of this book (2000-2003), more than 300 scientific articles cited Pavlov's work that forms the basis for this discussion. One especially fascinating recent study demonstrated how your psychological state at the time of conditioning and extinction may play a part in the treatment of classically conditioned irrational fears, called phobias (Mystkowski et al., 2003). Researchers used desensitization techniques to treat participants who were terrified of spiders. Some received the treatment after ingesting caffeine while others ingested a placebo. A week later, all subjects were retested-some receiving caffeine and others a placebo. Those who were given the placebo during treatment, but received real caffeine at the follow-up, and those who had received real caffeine during treatment, but received a placebo at the follow-up, experienced a relapse of the fear response. However, subjects who were in the same drug condition, either caffeine or placebo, at treatment and follow-up, displayed a much lower return of their fear. This finding implies that if a classically conditioned behavior is placed on extinction, it may return if the conditioned stimulus is encountered in a different context from where the extinction took place.

CONCLUSION

These examples demonstrate how extensive Pavlov's influence has been on many scientific and research disciplines. For psychology in particular, few scientists have had as much impact in any single discipline. Classical conditioning is one of the fundamental theories on which modern psychology rests. Without Pavlov's contributions, behavioral scientists still might have uncovered most of these principles over the decades. It is unlikely, however, that such a cohesive, elegant, and well-articulated theory of the conditioned reflex would ever
have existed if Pavlov had not made the decision to risk his career and venture into the untested, uncharted, and highly questionable science of nineteenth-century psychology.


A renaissance for humanistic psychology

The field explores new niches while building on its past.

BY REBECCA A. CLAY
Print version: page 42

Long plagued by an image problem, humanistic psychology is undergoing revitalization.

Humanistic psychology has, of course, quietly influenced both American psychology and culture over many decades by informing the civil rights debate and women's rights movements, for example. But in recent years, there's mounting evidence of renewal in the field itself.

In 2000, humanistic psychologists convened a historic conference that re-energized the field while revealing that the effects of managed care, psychopharmacology and other trends are resulting in many humanists branching into exciting new practice arenas. Last year, the field published several landmark texts that humanists hope will form the basis of new courses that will attract newcomers to the field. And schools across the nation are reporting that interest among students is already skyrocketing.

"There is room for great optimism about the future of the field," says Larry M. Leitner, PhD, president of APA's Div. 32 (Humanistic) and a psychology professor at Miami University in Oxford, Ohio.

Influencing mainstream psychology

Emerging in the late 1950s, humanistic psychology began as a reaction against the two schools of thought then dominating American psychology. Behaviorism's insistence on applying the methods of physical science to human behavior caused adherents to neglect crucial subjective data, humanists believed. Similarly, psychoanalysis's emphasis on unconscious drives relegated the conscious mind to relative unimportance.

The early humanistic psychologists sought to restore importance of consciousness and offer a more holistic view of human life. Abraham Maslow, for instance, developed a hierarchy of motivation culminating in self-actualization. Carl Rogers introduced what he called person-centered therapy, which relies on clients' capacity for self-direction, empathy and acceptance to promote clients' development. Rollo May brought European existentialism and phenomenology into the field by acknowledging human choice and the tragic aspects of human existence.
In 1964, these and other influential figures came together in Old Saybrook, Conn., to consolidate their movement. Over the next decade, humanistic psychology's ideas informed the civil rights, women's liberation and antiwar movements and gained widespread popularity in the wider culture.

In the academic world, however, humanistic psychology's rejection of quantitative research in favor of qualitative methods caused its reputation to suffer and its adherents to be marginalized.

Now that's changing, says Donald P. Moss, PhD, author of "Humanistic and Transpersonal Psychology: A Historical and Biographical Sourcebook" (Greenwood, 1998). According to Moss, humanistic perspectives inform much of mainstream psychology.

"When humanistic psychology came to the fore in the 1950s, psychology was restricted to studying observable behavior for the most part," says Moss, a partner at West Michigan Behavioral Health Services in Grand Haven and Muskegon. "Today we're no longer surprised when a psychological researcher wants to study cognitions, thinking and feeling as part of psychological research. Psychology has reclaimed the totality of human experience."

For many humanistic psychologists, the recent positive psychology movement is simply humanistic psychology repackaged. Similarly, crisis counseling's emphasis on empathic listening finds its roots in Rogers's work. In the wider culture, the growing popularity of personal and executive coaching also points to humanistic psychology's success. And Moss believes humanistic psychology's tenets will only become more relevant as the nation ages, creating a culture preoccupied with facing death and finding meaning in life.

In fact, humanistic psychology has been so successful at influencing mainstream psychology and American culture that the field recently suffered what Maureen O'Hara, PhD, calls an "identity crisis." Had humanistic psychology permeated the culture so completely that the movement itself was no longer necessary?

To answer that question, the field convened a conference called Old Saybrook 2 in 2000. More than 300 people gathered at the State University of West Georgia to explore the movement's future.

"Participants concluded that the human needs, hunger, questioning that had inspired our original thinkers were just as urgent today," says O'Hara, a member of the conference steering committee and president of Saybrook Graduate School and Research Center in San Francisco. "People are more interested in questions of spirituality, authenticity and meaning than they have been for a decade or two."

Exploring new niches

Of special interest to conference-goers was humanistic psychology's role in the face of such trends as health-care consolidation,
globalization and technology's ascendancy.

"Psychotherapy is under a great deal of new pressure from managed care on the one hand and the psychopharmacology and neuropsychology revolutions on the other hand," explains O'Hara. "When we all got together, we realized that there are a set of new vocations that have their roots in humanistic psychology ideas, but they're going somewhere new. We're finding ways to work with people in different arenas."

The key, she and others at the conference decided, is to look beyond the medical model of psychology. Instead of focusing on what's wrong with people, humanistic psychologists should find new ways of helping people strengthen what's right.

This nonpathologizing view opens up whole new areas of practice, say O'Hara and others. In the workplace, for example, humanistic psychologists can facilitate dialogues between employers and employees about the meaning of their work. In schools, they can encourage students to identify factors that promote alienation rather than self-actualization. In communities, they can help neighbors resolve conflicts and communicate effectively.

And the opportunities aren't just in this country, says O'Hara. Humanistic psychologists have "waded fearlessly" into dangerous situations to facilitate dialogues between white and black citizens of South Africa, Catholics and Protestants in Northern Ireland, and Contras and Sandinistas in Nicaragua.

**Spreading the word**

While the Old Saybrook 2 conference re-energized the movement, several new publications are helping the field counter its long-standing image problem.

"In some ways, we still suffer from our reputation of being touchy-feely, of being soft-hearted and soft-minded," says David J. Cain, PhD, a senior staff psychologist at the counseling center of Alliant International University in San Diego. "Now we're paying much more attention to research. The humanistic psychologist of today is still soft-hearted, but much more tough-minded."

A volume Cain recently co-edited with Julius Seeman, PhD, "Humanistic Psychotherapies: Handbook of Research and Practice," reflects that new tough-mindedness. To counter the field's reputation for sloppy science, the volume draws on rigorous research in its description of various psychotherapeutic models.

But Cain's book isn't the only one. "All of a sudden, there's a plethora of new humanistic books out there," he says.

"The Handbook of Humanistic Psychology: Leading Edges in Theory, Research, and Practice" is another book humanistic psychologists point to as a recent landmark. By providing a broad overview of...
humanistic psychology's history, methodologies and applications to current affairs, the volume's editors hope to provide an alternative to the outdated materials that have helped limit the field's growth in the past.

"Mainstream introductory psychology texts have either ignored humanistic psychology altogether or given it token space," says senior editor of the handbook Kirk J. Schneider, PhD, a private practitioner in San Francisco who is also an adjunct faculty member at Saybrook. "Not only are the field's pioneers being neglected but also the field's interest in very contemporary, relevant issues like gender, multiculturalism and ecology. And these do not even begin to encompass the valuable contributions humanists are making in the areas of health care, spirituality and social action."

Schneider hopes that his and other new books will inspire the creation of humanistic psychology courses at universities around the country and help bring a new generation to the field. Attracting fresh blood is crucial, say others, citing the imminent retirement of many humanistic psychologists and the displacement of others into such fields as counseling, religious studies, organizational studies and peace studies.

According to O'Hara, student interest in humanistic psychology is already soaring. The Saybrook Graduate School has doubled its student body in just four years, for example.

Fortunately, O'Hara says, there's plenty of work for humanistic psychologists.

Says O'Hara, "If what you have is a way to help people address the significant questions of their lives, then there are 'Help Wanted' signs all over the place."

Rebecca A. Clay is a writer in Washington, D.C.
Culture and Health Psychology: Insights from a Socio-Cultural Perspective
Written by Ayse Uskul & Dave Sherman in Issue 10

The beginning of the 20th century featured an understanding of health that was dominated by a biomedical perspective, characterized by a reductionist point of view in which health was defined as the absence of illness. This view has long been replaced by a biopsychosocial model that emphasizes the role played by socio-cultural forces in the shaping of health (and illness) and related psychological experiences (Engel, 1977). In 1948, the World Health Organization (WHO) defined health as a complete state of physical, mental and social well-being and not merely the absence of disease or infirmity, calling attention to the complexity and multidimensionality of the concept. Adding social well-being to the definition opened the way to conceptualizing the individual as a social being, with health being about more than mere physiology. This shift in the definition of health and the factors responsible for disease prevention and health promotion is mirrored by a shift in the study of health and illness in disciplines such as psychology that have traditionally focused on the individual as the unit of analysis and the force primarily responsible for avoiding disease and promoting well-being. In more recent psychological approaches to health and illness, individuals are increasingly viewed as part of a larger network of forces, significantly influenced by their socio-cultural environments (e.g., Helman, 2007; Gurung, 2010).

Developing a culturally sensitive and meaningful understanding of health and illness is important for both theoretical and applied reasons. From a theoretical standpoint, psychological models designed to understand health and illness are typically developed in the western parts of world and tested with local participants. Models can be expanded, modified, and improved by studying their generalizability across cultural groups. This exercise improves the validity of the scientific study of human psychology and thus enables models to develop and test culturally meaningful predictions.

Incorporating culture into the study of health and illness is also important from an applied standpoint. For example, developing interventions to improve health via promotive, preventive, curative, or rehabilitative activities is virtually impossible if this exercise is stripped of cultural knowledge. Further, health disparities, for example in the form of discrimination and prejudice in health care settings or vast differences in prevalence rates of certain diseases between different groups in a society, may be understood and tackled by having a better understanding of the cultural bases of such problems. Moreover, some diseases tend to be culture-specific, such as Hikokomori (prevalent in Japan) and anorexia (prevalent in developed western societies). Understanding the underlying reasons, ways of prevention and treatments for such diseases also necessitates a cultural approach to health and illness.

A framework for understanding cultural differences in psychology of health and illness
In the social sciences, culture has been defined in numerous ways. Most definitions refer to a set of contexts (e.g., structures and institutions, values, traditions, and ways of engaging with the social and nonsocial world (e.g., Shweder & LeVine, 1984) that are shared among members of a society and transmitted across generations through social learning (e.g., Richerson & Boyd, 2005). As can be seen here, such definitions of culture are typically broad and it is often difficult to decide how the concept of culture should be included in empirical work. Therefore, psychologists have proposed features of cultures to be used as organizing constructs. The most commonly used constructs to account for observed cultural differences and similarities in human psychology are individualism and collectivism (e.g., Hofstede, 1980; Kagitcibasi, 1997; Triandis, 1995). These constructs have been particularly useful for understanding cultural differences as to how people view themselves and their relationships with...
others. As we argue below, these differences are important in understanding cultural differences in health and illness related experiences.

In individualistic cultures, such as the United Kingdom or the United States, the dominant model of the self is an independent self characterized by self-defining attributes which serve to fulfil personal autonomy and self-expression (Hofstede, 1980; Kim & Sherman, 2007; Markus & Kitayama, 1991; Oyserman, Coon, & Kemmelmeier, 2002; Triandis, 1995). People are seen as agentic and thus responsible for their own decisions and actions. Moreover, in cultures shaped by individualism, individuals favour not missing chances over not making mistakes, focusing on the positive outcomes they hope to approach rather than the negative outcomes they hope to avoid (e.g., Lee, Aaker, & Gardner, 2000). Relationships are seen as freely chosen and relatively easy to enter and exit (Adams, 2005).

By contrast, in collectivistic cultures, such as many East Asian cultures, the dominant model is an interdependent self embedded within the social context and defined by social relations and memberships in groups (e.g., Markus & Kitayama, 1991; Triandis, 1995). People are seen as relational or communal and their decisions and actions are seen as heavily influenced by social, mutual obligations and the fulfilment of in-group expectations (e.g., Hofstede, 1980; Oyserman et al., 2002; Triandis, 1995). In such cultures, individuals tend to be motivated to fit in with their group and maintain social harmony; they focus on their responsibilities and obligations while trying to avoid behaviours that might cause social disruptions or disappoint significant others (Markus & Kitayama, 1991). They favour not making mistakes over not missing chances, focusing on the negative outcomes they hope to avoid rather than the positive outcomes they hope to achieve (Elliot, Chirkov, Kim & Sheldon, 2001; Lee et al., 2000; Lockwood, Marshall, & Sadler, 2005). Relationships are seen as less voluntary and are relatively more difficult to leave (Adams, 2005).

It should be noted that individualism and collectivism are two of many constructs researchers use to understand cultural differences in psychological functioning and research using these constructs, by no means, captures the breadth of the growing body of research on culture, health, and illness. Other important constructs that distinguish cultures include uncertainty avoidance, masculinity, and power distance (Hofstede, 1980), tightness versus looseness (Triandis, 1995), and survival versus self-expression (Inglehart, 1997). For the current piece, however, we focus on the link between individualism/collectivism and health and illness. In particular, we discuss a few select examples of our own and other recent research that implicitly or explicitly uses an individualism-collectivism framework to cross-culturally test models of health communication and social support seeking.

Culture and health communication

Studies testing the effectiveness of health communication targeting an audience of diverse cultural backgrounds have begun to incorporate messages congruent with the audience’s prevalent cultural frame. The underlying assumption is that if health communications match culturally salient characteristics, messages will feel more relevant and therefore will be more likely to influence judgments about appropriate behaviour. Indeed, research shows that messages are more persuasive when there is a match between the recipient’s cognitive (e.g., Petty, Wheeler, & Bizer, 2000) or motivational (e.g., Cesario, Grant, & Higgins, 2004; Sherman, Mann, & Updegraff, 2006) characteristics and the content or framing of the message. For example individuals with a tendency to be more responsive to cues of reward are more convinced when presented with messages framed in terms of benefits of flossing one’s teeth, whereas those with a tendency to be more responsive to cues
of threat or punishment are more convinced when messages are framed in terms of the costs of failing to floss one’s teeth (Sherman et al., 2006).

Recent research suggests that matching health communications to motivational strategies adopted at varying levels by different cultural groups is a way to positively influence health behaviour change. Recent work by Uskul, Sherman, and Fitzgibbon (2009) on the use of dental floss tested the hypothesis that health messages will be more persuasive if they are congruent with the cultural patterns of motivational strategies predominant in Western (individualistic) and Eastern (collectivistic) cultures. They drew on the literature suggesting that people from individualistic cultures are more motivated to seek positive outcomes whereas those from more collectivistic cultures are more motivated to avoid negative outcomes (Lee et al., 2000). Individualistic white British participants (who were more focused on seeking positive opportunities) were more persuaded (i.e., had more positive attitudes and stronger intentions to floss) when they received the message framed in terms of the benefits of flossing (gain-frame) than when they received the message framed in terms costs of failing to floss (loss-frame). By contrast, the collectivistic East-Asian participants (who were more focused avoiding negative contingencies) were more persuaded when they received the loss-framed message than the gain-framed message. Thus, the interplay of individual difference factors (motivational orientation), socio-cultural factors (cultural background), and situational factors (message frame) influenced important factors related to health behavior change.

To examine the effect of matching message content to culturally shaped aspects of the self, Uskul and Oyserman (in press) have employed a culturally informed social cognition framework (see Oyserman & Lee, 2008) which suggests that what comes to mind at a given moment depends on the available cues in one’s environment, and momentary cues can increase salience of culturally shaped orientations in ways of information processing. Specifically, they tested the effectiveness of culturally matched health messages after making salient the dominant cultural orientation. Matching health messages to salient cultural orientation increased persuasiveness; further, culturally relevant messages were more persuasive if they come after being reminded of one’s dominant cultural orientation. Individualist European Americans primed to focus on individualism were more persuaded by health messages associating health behavior with negative physical consequences for the self, whereas collectivistic Asian Americans primed to focus on collectivism were more persuaded by health messages associating health behavior with negative social consequences. Thus, message effectiveness can be increased by reminding potential recipients of their dominant cultural orientation.

**Culture and social support**

How people cope with health problems differs across cultural groups (e.g., Culver, Arena, Wimberly, Antoni, & Carver, 2004; Gurung, Taylor, Kemeny, & Meyers, 2004). Cultural differences, particularly in the use of social support, have been shown in studies comparing individuals of Asian, European-American, and Asian American backgrounds (for a review, see Kim, Sherman, & Taylor, 2008). Studies using various methods and samples from different groups with Asian heritage (Chinese, Japanese, Korean, and Vietnamese) have consistently found that Asians and Asian Americans seek less social support than European Americans (Kim, Sherman, Ko, & Taylor, 2006; Taylor, Sherman, Kim, Jarcho, Takagi, & Dunagan, 2004).

The underlying reasons for cultural differences in social support seeking center on the notion that Asian Americans are more concerned about the negative consequences that seeking support may have for their relationships. They are more concerned that support seeking will cause them to lose face, to disrupt group harmony, and to be criticized by others; these relationship concerns seem to discourage...
them from seeking emotional and instrumental social support from their social networks. Other potential factors such as the availability of unsolicited support and concerns regarding losing one’s independence are found not to be related to their use of social support to cope with stressors (Kim et al., 2006; Taylor et al., 2004).

Given the positive effects of social support seeking on physical well-being in the form of reduced levels of depression or anxiety during stressful times (Fleming, Baum, Gisriel & Gatchel, 1982), positive adjustment to a series of diseases such as cancer (e.g., Stone, Mezzacappa, Donatone & Gonder, 1999), and faster recovery speed from illness (e.g., House, Landis & Umberson, 1988), the finding that individuals of Asian origin tend to seek less social support than their European American counterparts may raise concerns. Research, however, shows that while Asian groups tend to avoid explicit patterns of social support seeking that involve the disclosure and sharing of stressful events typically adopted by individuals in Western cultures, they benefit from implicit social support. Implicit social support can involve actions such as merely thinking about close others or spending time and doing activities with friends without disclosing the stressor. Thus it refers to the emotional comfort that one can attain from relationships without discussing problems caused by stressful events and thus is unlikely to raise potential concerns about their relationships (Kim et al., 2008).

This interaction between cultural group and form of social support has been shown in a number of studies, including one demonstrating the beneficial effects of culturally appropriate forms of social support and the harmful effects of culturally inappropriate forms of social support at the physiological level (Taylor, Welch, Kim & Sherman, 2007). Asian Americans experienced lower levels of cortisol, a hormone usually referred to as the "stress hormone" as it is secreted in higher levels during body’s response to stress, during an acute laboratory stressor when they sought implicit rather than explicit support, whereas European Americans experienced lower cortisol levels when they sought explicit rather than implicit support. An online diary study shows that European Americans reported using explicit social support in coping with their daily stressors to a greater extent than do Koreans; Koreans reported using implicit social support to a greater extent than do European Americans (Kim et al., 2008). These findings point to the importance of exploring what social support means and its effects in different cultural groups.

A recent set of studies further underlines the need to test health-related findings in Western groups against those in groups of other cultural backgrounds. Uchida, Kitayama, Mesquita, Reyes, and Morling (2008) explored the relationship between emotional support and well-being and physical health. In their initial study of college students, a positive effect of perceived emotional support on subjective well-being was found to be weak among Euro-Americans; it disappeared when self-esteem was statistically controlled. In contrast, among Japanese and Filipinos, perceived emotional support positively predicted subjective well-being, even after self-esteem was controlled. The authors extended these findings in a second study with an adult sample using different well-being and physical health measures; in this study, perceived emotional support positively predicted well-being and health for Japanese adults, but such effects were virtually absent for American adults. Note that unlike the studies reviewed earlier showing the detrimental effects amongst Asians and Asian Americans of social support seeking (Kim et al., 2008), these studies show the beneficial effects of perceived support (i.e., support that was not necessarily asked for). As these studies illustrate, cultures vary in the impact of perceived emotional support on well-being and physical health.
Conclusion

So far, the evidence suggests that socio-cultural environments play an important role in health and illness-related outcomes. Importantly, research shows that socio-cultural factors can shape psychological constructs such as the factors that determine how people respond to health messages and use their social support networks as well as how illness-related thoughts are shaped and when behaviour is likely to change -- issues commonly tackled by psychological models of health behaviour. It is therefore essential that existing models of health behaviour are tested cross-culturally and modified accordingly. Increasing the understanding of the role of culture in health and illness would also help developing culturally sensitive and effective ways of preventing and curing disease. Despite the growing amount of research on culture and health and the preliminary attempts to collate the vast amount of knowledge accumulated in the hitherto disconnected subfields of cultural and health psychology, more research is certainly required which will help researchers, practitioners, and lay people acquire a better understanding of how the psychological experiences of illness and health are shaped by individuals’ socio-cultural environment.

Glossary

**Individualism** refers to a cultural worldview that encourages a focus on rights above duties, an emphasis on personal autonomy, uniqueness, self-reliance, and personal independence.

**Collectivism** refers to a cultural worldview that encourages a focus on duties above rights and an emphasis on group membership, harmony, interpersonal connectedness, context sensitivity.

**Social support** refers to information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations. It is one of the effective ways by which people can cope with stressful events.

References


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Selfless Genes: A New Revolution in Biology

In 2006, I attended the annual meeting of the Human Behavior and Evolution Society in Austin, Texas and listened to E. O. Wilson -- the founder of sociobiology and one of the greatest biologists since Darwin -- deliver the keynote address. Wilson, about 75 years old at the time, didn't come to Austin to play the grand old man. He came to pick a fight. When it was over, a buzz of excitement filled the room: "Did he really just call selfish gene theory 'a monumental mistake'?" Yes he did. And he repeats the charge in his fascinating and controversial new book, The Social Conquest of the Earth.

In the late 1960s and early 1970s evolutionary biologists celebrated a fundamental breakthrough. William Hamilton's inclusive fitness theory (aka selfish gene theory) indicated that organisms are narrowly "designed" to spread copies of their own genes, whether those genes are located in their own bodies or in the bodies of their relatives. Hamilton's work seemed to show exactly how evolution worked, and also how it didn't work. Group selection -- the idea that competition between groups of organisms shapes genomes -- was declared dead. In effect, this defined altruism -- real and authentic selflessness -- out of existence. On a planet ruled by selfish genes, "altruism" was just masked selfishness. The biologist Michael Ghiselin expressed this beautifully, "Scratch an altruist and watch a hypocrite bleed."

The Selfish People

Let's run a quick thought experiment to see how biologists reached this conclusion. Imagine that long before people spread out of Africa there was a tribe called The Selfless People who lived on an isolated island off the African coast. The Selfless People were instinctive altruists, and their world was an Eden.

But then there was the fall. A genetic mutation produced a single tribesman who was naughty, not nice. He had a simple prime directive encoded in his DNA: Look out for number one (and for your kin folk -- and perhaps your allies, but only if you're sure they'll reciprocate). The tribesman had selfish genes.

The biological definition of selfishness: behavior that promotes one's own reproductive success.

The biological definition of selflessness: behavior that promotes someone else's reproductive success at the expense of one's own.

The single tribesman with selfish genes would -- by definition -- leave more descendants behind, eventually crowding altruistic traits out of the gene pool. The Selfless People would become The Selfish People.

The big 1960s breakthrough was simply this: selfish genes beat selfless genes; they beat them bloody; they beat them every single time.

The Selfless People

For a generation, this logic ruled evolutionary biology, and especially evolutionary psychology. But most of the biologists who were responsible for the 1960s breakthrough have gradually backed off their positions (the major hold out is Richard Dawkins, who writes that the "great heresy" of group selection "really is wrong").

Our thought experiment played out the way it had to. But that's because it had one unrealistic component: The Selfless People live in total isolation from all other tribes. And this isolation makes all the difference.

Now, let's run the thought experiment more realistically. This time the Selfless People live in a rich African valley that they share with another tribe. The two tribes frequently come into conflict over hunting grounds, old grudges, and insults barked across the river. And so the tribes fight, as tribes of men have always fought.

Imagine that the valley's second tribe is comprised mainly of selfish actors. Other factors held equal, who wins: the tribe of self-sacrificing altruists or the tribe where every warrior is looking out for number one? Won't it be the Selfless People? Won't the Selfless People tend to dominate selfish tribes in most competitive situations? And, as a result, won't selfless genes proliferate?

Charles Darwin thought so. In The Descent of Man, Darwin ran his own thought experiment, pitting selfless against selfish tribes:

It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men of the same tribe, yet that an advancement in the standard of morality and an increase in the
number of well-endowed men will certainly give an immense advantage to one tribe over another. There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to give aid to each other and to sacrifice themselves for the common good, would be victorious over other tribes; and this would be natural selection.

Here, Darwin describes how group-level competition can produce authentic altruism. In The Social Conquest of the Earth, Wilson updates Darwin's case, mainly drawing on his expertise as an entomologist. Wilson argues that the incredible levels of cooperation and altruism within ant colonies testify to millions of years of vicious conflict between colonies. Darwin and Wilson agree: no matter the species, if you have intense and sustained group-level conflict, selfless genes beat selfish genes; they beat them bloody; they beat them every single time.

Of course, it would be a great distortion to suggest that people are -- like ants -- selfless all of the time. But the vision of rigid selfishness that arose from biology's rejection of group selection was an equally great distortion. The real picture is more complex. Natural selection occurs at the level of groups and individuals. Between-group competition favors selfless genes while competition inside groups favors selfish genes. As Wilson and a colleague wrote, "Selfishness beats altruism within groups. Altruistic groups beat selfish groups. Everything else is commentary."

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