

THINKING AS A CULTURAL PROCESS

All human thinking is culturally organized. It takes place through mediating devices—signs, general heuristics, among others—and makes use of value-embedded beliefs and superstitions for guiding the mental processes. The social surroundings for human thinking are purposefully suggestive, guiding the person towards some ways of feeling and thinking, and away from others. Myths and counter-myths, and fairy tales, supported by different social representations all set up the social texture for human thinking.

However, human beings think *as individuals*. The primacy of personal subjective worlds in human thought is clear and unambiguous. Human thought processes are usually hidden from others; thinking is a private and hidden affair. Yet, the ways in which people think, and the psychological tools they use in the process, are results of cultural construction. Thinking processes are historically based on the social relations with others and with the environment. In their established form, these processes are internalized and unique to the persons who do the thinking. It is in human thinking that the social and the personal are united within a cultural (semiotic) process of making sense of one's world, and of oneself.

An Excursion into the History of Psychology of Thinking

The study of thinking in psychology got its impetus from the experimental introspective studies of Karl Bühler, Otto Selz, Robert Ogden, Oswald Külpe and Narziss Ach in the beginning of the twentieth century. The intellectual traditions of the "Würzburg School" in psychology of this time have largely been forgotten—largely due to the stigmatization of the introspective methodology that characterized the experimental work of Bühler and others.

The introspective study of thinking by "the Würzburgers" was followed by the work of Karl Duncker and Max Wertheimer on processes

of productive problem-solving (Simon, 1999). Most of contemporary cognitive psychology originates in the work of Wertheimer and Duncker, and thus it can be claimed that the "Würzburg school" has been the forerunner of all cognitive science. Yet that is not the end of the story, as we can find out from the history of cognitive science.

Psychology has rewritten its history in a *pars pro toto* manner—tracing its recent roots to the experimental psychology of Wilhelm Wundt and his laboratory (opened in Leipzig in 1879). Wundt's own focus on cultural psychology (*Völkerpsychologie*) has usually been de-emphasized (quite incorrectly) as the ruminations of an experimentalist in his old age. A more important parallel tendency in the history of cognitive science is the contribution of the Austrian philosopher Franz Brentano. It is from Brentano's work that different trajectories in further developments in psychology and philosophy have acquired the focus on the inherent potentials for further change in psychological phenomena. A phenomenon like thought entails both an abstraction from the experience the person has up to the present moment, and a potential for further thinking facing the future uncertainties. Edmund Husserl's phenomenological philosophy, built on the notion of inherent intentionality, grows out from the Brentano line of thinking. Likewise, the work of Alexius Meinong on presentation (*vorstellung*—see Haller, 1996; see also Chapter 3), and the language philosophy of Anton Marty (Mulligan, 1990), as well as the Polish school of logic of Kasimir Twardowski grew out of the Brentano tradition. It can be argued that the recent history of psychology as a science builds upon two trajectories—those of Wundt's experimental tradition and Brentano's philosophical orientation. Sometimes these trajectories have merged; at other times (and in some countries) they have been kept anxiously separate by psychologists who were fearful of the implications of subjective philosophy for their science.

An example of the merging of the two trajectories in the history of the study on human reasoning is Fritz Heider. Heider migrated between different Continental European schools of thought—Alexius Meinong's in Graz, Karl Bühler's in Vienna, and Heinz Werner's in Hamburg. After emigrating to the United States, Heider established himself in Kansas, where he created his fundamental synthetic work on the human reasoning processes—*the Psychology of Interpersonal Relations* (Heider, 1958). The study of social attributions grows out of that classic contribution. Yet, its main focus was different—to understand how language structures the activities of the human mind. All of the directions of thought that emanated from Franz Brentano's legacy shared the focus on language as the mediator in human thinking processes. They also built

their theories on the premise that logic is the formal basis for human mentality.

THREE LOGICAL PROCESSES IN HUMAN REASONING

Logic was the "gold standard" of human intellectual enterprise at the turn of the twentieth century, and continued in that role until after World War II. Logic provided human beings with rules for "correct thinking," yet there could not be any single set of such rules. As a result, we are still faced with a variety of claims for such a normative role, while no clear definition of logic exists. After considering a multitude of existing views on logic, Boris Bogoslovsky managed to create one: "Logic is a complex of relative and limited (as contrasted with absolute and universal) generalizations on interrelationships of statements helpful for the most efficient, productive, and excellent use of the statements" (1928: 42).

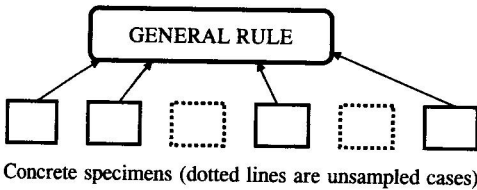
The criteria for "efficient," "productive," and "excellent" uses can, of course, be only socially constructed. Hence, any logical system—formalized as it may be—is surrounded by the culturally pre-set conditions of use of the strict logical forms in a particular social setting.

Human reasoning is a process of mental construction made available through human semiotic capabilities. In this respect, all rules of logic are necessarily semiotic phenomena, and thus cultural-historical constructions. There are three basic forms of reasoning within the realm of logical inference (see Figure 6.1).

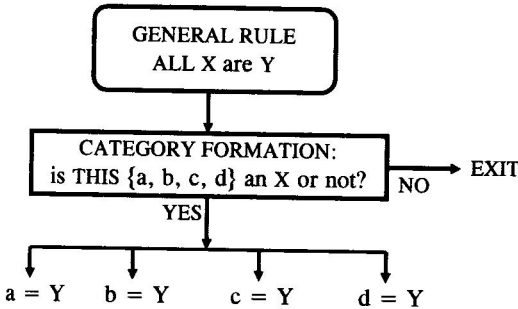
First, there is the *deductive process*, which involves the construction of specific novel ideas on the basis of generally believed premises and conventional derivation rules. It is best known through the examples of syllogistic reasoning tasks, in which the reasoner arrives at the conclusions through moving from general premises towards concrete solutions. This is often referred to as "rule-based reasoning." The scheme of deductive reasoning (B in Figure 6.1) constitutes a basically closed scheme of moving from the general stated rule to interpretational activity of category formation. That activity is the only open moment in the scheme, a moment that is not predetermined by the fixed rule. If a particular specimen is found to belong to the class X, the deduction that it is Y follows immediately (for example, in case of a, b, c, d). If the specimen is not detected to belong to the specified category, it escapes the deductive conclusion otherwise pre-set by the rule.

Figure 6.1: Inductive, Deductive, and Abductive Reasoning Processes

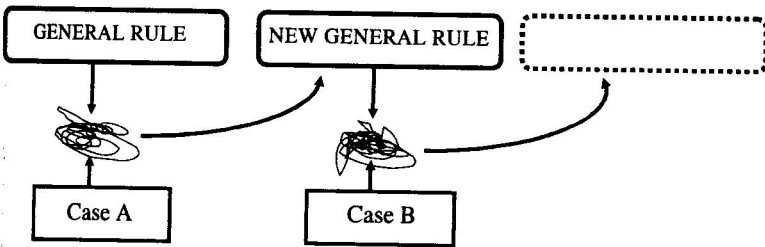
A. Inductive reasoning



B. Deductive reasoning



C. Abductive reasoning



Second, there is the *inductive process*, which entails generalization of ideas based on the specific lived-through experiences of the person. In psychology's research methodology, this process is exemplified by efforts to arrive at generalized knowledge through accumulation of data. This process can be found in modern cognitive psychology under the labels of

“instance-based” reasoning. The process of inductive generalization operates with observations of the specific phenomena—a collection of specimens of a class that can be observed. The set of actually observable specimens is smaller than the set of all of the members of the class. It has been known since Aristotle that the ideal case of inductive inference depends upon *full enumeration of the set of specimens*. Obviously, that ideal is not reachable in practice. In most cases, the full set of specimens in a class is either indeterminate, or impossible to get access to.

Third, there is the process that synthesizes the two: the *abductive process*. It involves a structure of a reasoning process where the deductive and inductive sides mutually interpenetrate, and give birth to novel ideas (Santaella, 2007). The novelty construction in reasoning takes place both in the realm of symbolic content (reasoning rules are not “empty” processes), and in the domain of symbolic constraints (following certain rules or guidelines, which guide the form of reasoning). The scheme of abductive reasoning (Figure 6.1C) is based on the bidirectional relation between the general (rule) and a concrete case. Their mutual mismatch—contradiction—leads to a generalizing leap that reconstructs the general rule in a new version. That new rule then enters into relation with another concrete case, and becomes reconstructed again.

SOCIAL POWER OF DEDUCTION

The development of cognitive (mental) functions has two facets—that of knowledge creation (epistemological function), and that of mediating specific functions of social control.

Example 6.1: Insertion of Deductive Reasoning Patterns through Schooling

The main finding from comparisons of formally schooled and not-schooled persons in the realm of solving reasoning tasks is the mastery of automatization. The schooled persons have developed automatized schemes that are applied to the form of the task and assume the deductive reasoning scheme at an instant. The people without such schooling remain free to consider various concrete conditions and apply their inductive intuition (Luria, 1976). For example, the following syllogism is given to a person:

Major Premise: In the Far North, where there is snow, all bears are white.

Minor Premise: Novaya Zemlya is in the Far North and there is always snow there.

Question: What color are the bears there?

The benefit of formal education makes it possible to recognize this task immediately as a deductive reasoning task that has to be solved by a simple application of rules. By following the rule, if *all X are P* and *A is X*, it follows that *A is P*. Yet, the unschooled subjects found it impossible to accept the scheme taught in school. In Luria's expedition to Central Asia in the early 1930s, a 37-year-old illiterate man, Abdulrakhim, from a remote Kashgar village responded to the presentation by assuming a strictly inductive orientation towards the task:

Abdulrakhim: There are different sorts of bears.
[the syllogism is repeated]

Abdulrakhim: I don't know; I have seen a black bear, I have never seen any others. . . . Each locality has its own animals; if it's white, they'll be white; if it is yellow, they will be yellow.

Experimenter: But what kinds of bears are there in Novaya Zemlya?

Abdulrakhim: We always speak only of what we see; we don't talk about what we haven't seen.

Experimenter: But what do my words imply? [the syllogism is repeated]

Abdulrakhim: Well, it's like this: our tsar isn't like yours, and yours isn't like ours. Your words can be answered by someone who was there, and if a person wasn't there he can't say anything on the basis of your words.

Experimenter: But on the basis of my words—In the North, where there is always snow, the bears are white, can you gather what kind of bears there are in Novaya Zemlya?

Abdulrakhim: If a man was 60 or 80 and had seen a white bear and had told about it, he could be believed, but I've never seen one and hence I can't say. That's my last word. Those who saw can tell, and those who didn't see can't say anything (Luria, 1976: 108-9).

The issue of refusal to assume a deductive reasoning scheme here indicates the major domain where the "effects of formal schooling" can be found—in *getting the schooled subjects to automatically recognize and assume a particular position* in relation to a given task.

SOCIAL CONTROL THROUGH DEDUCTIVE REASONING

Strictly speaking, this "formal schooling effect" is not an effect of schooling *per se*. Instead, it demonstrates effective internalization of the social position of assuming the correctness of the suggested position. The

schooled person, who immediately recognizes the task as a syllogism and uses the deductive line of reasoning to solve it, necessarily accepts the assertion of the person who gives the task, without questioning whether deductive logic is applicable to the given content material. Consider, for instance, a syllogistic task which could have been set in the context of medieval Europe (or Europe's North American colonies):

Major Premise: All witches *should be burnt* at stake

Minor Premise: Tituba¹ is a witch

Conclusion: ???

In this example, we can observe the insertion of a social value-based action command as content into a deductive reasoning scheme. A social power source who sets up the deductive scheme can expect to have high source credibility (in terms of communication). When the scheme is automatically accepted (for example, "this is a syllogistic task" which "is given as such by a trustable source") it can lead to the social action desired by the power source. It is due to this social power function that formal schooling has high renom e for social institutions. Every social power that captures another ethnic group or subgroup in a colonial or missionary effort is likely to introduce a schooling context where psychological tools that are beneficial for social control efforts are promoted in the young developing persons.

Example 6.2: Application of the Deductive Reasoning Process in Extermination

Deductive reasoning is widely applied in acts of social violence as rationale. Here, we look at the psychological system of a mass murderer: an extermination camp commander Stangl who (in his early 30s during World War II) was the chief of police of a euthanasia clinic and then commander of concentration camps in Sobibor and Treblinka (Welzer, 2004). What surprises the readers of his account about his deeds—explicated in an interview 25 years later—is the absence of moral qualms within Stangl's self-expression about his leadership role in the massive killing of prisoners. Instead, Stangl dwells upon different accusations against him as inadequate from the viewpoint of his moral integrity. What bothered him were little things which he specifically had done, and not the role of what he was.

Stangl had scarcely any or no problems at all with his "work," which in his view he was obliged to carry out, and this was particularly the case when he could regard himself as a "good guy," just, objective, free of partiality, and

sometimes helpful and friendly above and beyond the call of duty. It will have been the maintenance of this self-image of the exterminator camp commander which ensured that Stangl, despite his actual function, which consisted in leading masses of people to their deaths, was nevertheless not tortured by any moral qualms. *On the one hand, a task which fits into a universe of causes to be justified one way or the other; on the other, an individual, from case to case distanced from his role, who is ready at all times to fulfil his duties as required, but who at the same time also wants "to remain a human being"* (Welzer, 2004: 26–27; emphases added).

Stangl's case is not extraordinary: research in social psychology (Milgram, 1974, 1992) shows that such distancing of oneself from the social role of obedient reaction is universal. The difference is merely in the extent and kind of destructiveness that such a role-distancing mechanism is set up to guarantee.

Social Role Distancing and Acceptance of Deductive Reasoning Patterns

As Welzer very perceptively points out—"mass murder could not have been carried out with amoral perpetrators" (Welzer, 2004: 30). The mechanisms that make personal participation in acts of mass destruction possible are precisely the promotion of the "higher moral calling" that usually guide our humane acts. Only in the destructive cases these promoter signs are linked with the denigration of some designated outgroup. Based on such internalized sign field—uncritical acceptance of suggested major premises of syllogistic reasoning tasks—acts of mass destruction can be easily evoked. As is known from multiple genocides, even the fortification of the group differences by uniform is not necessary—the atrocities are easily committed against close neighbors. Deductive reasoning processes can be cognitive bases for social destruction.

THE VALUE OF INDUCTIVE KNOWLEDGE CONSTRUCTION

The example of Abdulrahim (Example 6.1) indicates the social resistance value of the personal insistence on relying only upon one's immediately-available and personally-accumulated knowledge. The person is in full control over what one knows, and nothing follows—from an inductive standpoint—from the words that some suspicious outsider (such as the researcher) is suggesting in the syllogistic reasoning task. The framing of a thinking task in either an inductively- or deductively-solvable problem is a result of social relationships.

Not only unschooled and illiterate peasants insist upon the primacy of the inductive reasoning schemes, so do scientists. Experimenters in any area of science would distrust data that has not been carefully obtained by inductive ways. Deductive reasoning would not allow the empirical reality to provide the researchers with the required correction for their general thinking. Without such corrections, science cannot proceed.

Of course, the full process of human understanding of the world entails both inductive and deductive components. How can they be united?

Unity of Induction and Deduction

Inductive and deductive reasoning processes cannot be separated from each other; rather, they function together.

Example 6.3 includes an example that represents such an indeterminate nature of a "purely" inductive "leap."

Example 6.3: Parents and Children

Consider a case where the inductive reasoning processes of both parents in this invented dialogue dominates over the deductive ones:

Parent 1: You know, last week John played with a vase, let it fall on the floor, and it broke into pieces.

Parent 2: I know, what you mean—Mary has done that many times with our coffee mugs. Thank goodness those do not break, these *children are such innocent playful creatures*.

Parent 1: Well, . . . you know . . . it is not so simple. The other day John took a paper napkin from the dinner table and brought it to the burning candle, proceeding to make a small fire on his plate. . . . We had to put out the fire!

Parent 2: How explorative! Mary has not done anything like that . . . but she explores her world, indeed, very actively. *Children are adventurous*, and come up with new and surprising actions.

Parent 1: Adventurous . . . hmm . . . yeah. Just yesterday we caught John in the bathroom. He was about to throw our Minnie—our dear little family cat—into the toilet! Those *children can be cruel* to animals, and *they are such little devils who come up with nasty ideas*. *Parents must always control them*.

In reality, no "purely" inductive generalization exists; if we see a generalization based on induction, it resorts to the use of some (usually implicit) general meanings (or cultural models). We have italicized the moments in Example 6.3 where such general notions are brought into the dialog. As can be seen, the deductive line of reasoning enters into the ongoing dialog in the form of implied general statements about children.

Aside from describing specific actions by children, parents revert to narrating upon what children in general "are like," or what they "can" do (or be). Parents chatting about their particular children (John and Mary), and comparing specific instances of their conduct, move to import a general meaning (or belief) into the discourse. Once it is imported, it can become a guide to further discourse in accordance with the whole complex implied by the general meaning or belief; for example, the general belief that "children are innocent" can guide further interpretations by parents, differently from a belief that assumes that "children are little devils."

All generalizations of the described kind (that is, inductively based but generically framed) go beyond the given particulars, and are constructed exactly for that purpose. Parental reasoning is oriented towards future encounters with the children's novel conduct; hence, present-time generalizations are functional for preparation of the adults for the (highly unpredictable) future. Such generalizations are not "correct" in any sense—since in the case of dynamic constructive processes which take place in irreversible time, the criteria for "correctness" (or "falseness") of any generalization are indeterminable in principle. Any novelty that emerges in development is in a way "wrong" or "incorrect" in relation to its predecessors. Once it becomes established as the next developmental state, it becomes "correct" in that role.

GENERALIZATION AND INDETERMINACY

The indeterminacy of generalization leads culture construction in several ways. First, there is a resulting variability of reception, understanding, and application of cultural knowledge. Second, there may come to exist conflicting meanings within the same corpus of knowledge. A good example is the conflicting opinions expressed by proverbs within the same language, such as "A spanking comes straight from heaven" vs "A good householder doesn't beat his animals" (implicitly, "let alone his children"; but also possibly, "this doesn't apply to children").

Sayings like these have come into existence as shared expressions of experience. They do not necessarily reflect upon uniformly shared meanings, and may have gained sustained circulation thanks to the nature of reality, which is not always singularly patterned. They also rely on the inclusion of value-positions into the reasoning process, which is clearly illustrated in both the above expressions. The value-positions are included arbitrarily and feed into the deductive support of the reasoning process at times when such statements are generated.

scheme. However, a more important point brought forth by both of our examples is the illustration of the proactivity of real-life reasoning. The purpose of the *if...then* statement is not to ascertain a universally true law but to plan and monitor one's action. The syllogistic form, which is a logically correct one, is a necessary tool in the organization of our *everyday thinking*, but the *deductive inference is never its pure result*, nor a result in itself. It cannot be a pure result because from the moment of its emergence, it becomes contextualized and gains meaning from the particular context in the given situation (the situation in the mind, so to speak). Although it is a product of syllogism, it is also meaningfully divorced from it by the meaning it has gained from the context from which it has emerged (Magariños de Morentin, 2005).

Furthermore, it is not a result in itself because it feeds into a future-oriented process of regulation of conduct. The re-contextualized result is not simply produced to stand out without use; it is produced for and immediately picked up by other ongoing thought processes. Everyday reasoning, therefore, is driven by purpose, and although it involves forms of both syllogistic deduction and inductive inclusion, it takes place within the frame of an irreversible real-time contextualized process. In that process, the two "types" of reasoning are not just intermingled but continuously interact in indeterministic ways, potentially creating new forms.

ABDUCTIVE REASONING IN PRACTICE

The reasoning process proceeds in irreversible time in its microgenesis, hence, it is the constant immediate future orientation that makes it possible for moves between inductive and deductive orientations to take place. In case of *both* inductive and deductive orientations, novelty can be created within the given micro-constructive process. It takes the form of either construction (or importation) of an encoded general meaning (if the person operates in the deductive orientation), or reconstruction of some personal experience of the past in the present (if in the inductive mode). In the ongoing flow of reasoning, the two orientations flexibly switch between each other and become coordinated in ways that allow for novel sense to be generated. It involves hypothesis generation, followed by subsequent testing.

Peirce (1955: 151) provided a general formula for abductive process:

The surprising fact (C) is observed
 If A were true, C would be a matter of course
 Hence, there is reason to suspect that A is true

Furthermore, in every situation where such pearls of wisdom are pronounced as a confirmatory seal on reality, they are made applicable to a concrete situation by an "inductive leap," which is aided by the offering of patterns towards which the leap may be made. A third result of the indeterminacy of generalization in culture-construction is that the implicit categorization of reality which is established is not necessarily clear. This speaks to the assumption that culture is comprised of something like schemas or patterns which are handed down in "tidy packages" (successfully or unsuccessfully). In fact, the packaging is nothing like tidy, although the labels might appear to be so.

What, then, could a deductively-driven process in parental reasoning look like? Example 6.4 can be viewed as continuation of Example 6.3, only now both parents complement each other's narrative by supporting the deriving of concrete conclusions from previously constructed major premises.

Example 6.4: Deductively Driven Reasoning Processes in a Dialog

Parent 1: There is so much cruelty in children. I see John often chasing our cat, and worry what could be done to make him behave gently towards Minnie.

Parent 2: Of, don't worry—he is just a little boy, and little boys are adventurous, they like new experiences. If I were you, I would not worry, boys need to capture the world, and chasing animals and experimenting with objects is their natural way, and a need for all males. But what should I do with Mary—she is my dear little girl, but she becomes interested in boyish ways of playing with toys. I try to buy her nice dolls, but she gets into rough play with trucks... is that what being in day-care is producing?

Again, we have underlined the general statements (about "cruelty" being a characteristic of children; hence applicable to John). In this example, the "figure \leftrightarrow ground" relationship of the two processes is reversed—the deductive process is in the foreground (and leads the talk about specifics in the parental discourse), while the inductive process remains implicitly in the background, interfering with the foreground.

UNITY OF REASONING THROUGH ABDUCTION

The overlap, or intermingling of the processes, is a place where the construction of new forms of reasoning takes place in the abductive