

# Schemata

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## 1 Definition

Schemata are cognitive structures representing generic knowledge, i.e. structures which do not contain information about particular entities, instances or events, but rather about their general form. Readers use schemata to make sense of events and descriptions by providing default background information for comprehension, as it is rare and often unnecessary for texts to contain all the detail required for them to be fully understood. Usually, many or even most of the details are omitted, and readers' schemata compensate for any gaps in the text. As schemata represent the knowledge base of individuals, they are often culturally and temporally specific, and are ordinarily discussed as collective stores of knowledge shared by prototypical members of a given or assumed community. The term was used in the 1930s in both psychology and literary theory, but entered wider currency in the 1970s in Artificial Intelligence research, later being re-incorporated into psychology and thence into linguistics, within the general area of cognitive science.

## 2 Explication

The terms used in this area have historically been highly variable and differ across disciplines. The term "schema" is often used as a superordinate label for a broad range of knowledge structures, including frames, scenarios, scripts and plans, as described below. "Schema" is also used as a synonym for "frame" (Minsky 1975) to refer to mental representations of objects, settings or situations. A restaurant schema/frame, for example, would contain information about types of restaurants, what objects are to be found inside a restaurant, and so on. The term "scenario" is also sometimes used for situational knowledge (Sanford & Garrod 1981). A "script" (Schank & Abelson 1977) is a temporally-ordered schema; it describes a reader's knowledge of stereotypical goal-oriented event sequences "that define a well-known situation" (422), so that a restaurant script would contain knowledge of the actions and sequence of ordering food, paying bills, and so on. In addition to a sequence of

events, most scripts have further “slots” to describe the “roles” (customers, waiters, chefs, etc.), “props” (menu, table, food, money, bill, etc.), “entry conditions” (customer is hungry, restaurant has food, etc.) and “results” (customer is no longer hungry, restaurant has less food, etc.) within the script. A “plan” (Schank & Abelson 1977) consists of knowledge about sets of actions needed to accomplish objectives and is used in non-stereotypical situations where there is no adequate script available.

Linguists, psychologists and narrative scholars employ schema theory to account for the interpretation of a text where the discourse itself does not provide all the information necessary for the discourse to be processed. Consider the following example: “John went to a restaurant for lunch. He ordered a salad, had a coffee and then went to the park for a walk.” This short text cannot describe all the actions, activities and situational information which a reader requires to comprehend it. Schemata and scripts supply the gaps in reader knowledge (that, for example, a restaurant is a place which serves food, that food once ordered is supplied, and that one must pay before leaving). The general notion of gap-filling has long been recognized in literary studies. Ingarden ([1931] 1973) refers to “spots of indeterminacy,” an idea later adopted by Iser ([1976] 1978), and Sternberg (1978, 1985) discusses “expositional gaps.” Research in Artificial Intelligence on schemata adds a detailed explanation of how inferences are made by utilizing generic knowledge in processing specific parts of a text. As schemata are situational and socioculturally dependent, some readers may supply more information from their schemata than others.

Schemata are therefore essential for establishing the coherence of a text (Toolan → Coherence [1]). Furthermore, schemata are dynamic (Schank 1982) to the extent that they accumulate details and are altered in the course of experience. If changing circumstances and new events contradict existing schemata or make them appear inadequate in a relatively minor way, they can be “tuned” (Rumelhart 1980: 52) to accommodate new generalizations. The relationship between texts and schemata is two-way: while schemata tend to lay the ground rules for how a discourse will be interpreted, discourses themselves may prompt readers to “tune” existing schemata and create new ones (Rumelhart & Norman 1978; Cook 1994: 182–84).

### **3 History of the Concept and its Study**

Some schema researchers (e.g. Cook 1994; Semino 1997) trace the philosophical notion of schemata back to Immanuel Kant. Another antecedent is *Gestalt* theory in psychology (Wertheimer [1923] 1938, [1925] 1938; Köhler 1930; Koffka 1935). Also in psychology, Bartlett (1932) used the term (which he credits to the earlier work of

the neurologist Sir Henry Head) to explain speakers' unknowing alteration of folktale details during retellings, with such alterations being made in line with the speakers' schemata. In literary theory in the 1930s, Ingarden ([1931] 1973) argued that there was a stratum of "schematized aspects" in the perception of literary works of art. After a lull of many years, schema theory re-emerged in the 1970s and 1980s, when schemata were refined within Artificial Intelligence as mental constructs of knowledge derived from an individual's experience and learning (in this sense often called "frames," e.g. Minsky 1975). While scripts were first identified by Schank & Abelson (1977), the focus of their work was mainly on computational aspects of comprehension. Bower et al. (1979) then provided evidence within cognitive psychology that readers employed scripts during their processing of a discourse. Later, Schank (1982) employed scripts in more detail as dynamic tools for discourse processing, breaking scripts down into component parts (Memory Organization Packets, MOPs) which could be combined into larger structures when required.

In narrative studies, schema theory has been important not only for its role in explaining gap-filling in reading, as discussed above, but also in relation to a reader's knowledge of the overall structure of stories, termed "story schemata" (e.g. Rumelhart 1975; Mandler & Johnson 1977; Mandler 1984), the cognitive equivalent of text-based story grammars. According to their proponents, story schemata contain sets of expectations about how stories will continue, although some psychologists (e.g. Black & Wilensky 1979; Johnson-Laird 1983) have questioned whether special cognitive structures are required beyond general reasoning. Knowledge of the form of texts has also been studied in the analysis of "super-coherence," de Beaugrande's (1987) term for thematic awareness, in postulating schemata for specific genres (Fludernik 1996; Herman 2002) and in the examination of knowledge of intertextual links (Eco 1984; Genette [1982] 1997).

Schema theory has also been used to construct new theories about the nature of narrative. Fludernik (1996) employs it to redefine narrativity (Abbott → Narrativity [2]), suggesting that cognitive parameters which are "constitutive of prototypical human experience" (12) are the main criteria for what makes a story a story, not action sequences as traditionally thought. In her model, "there can therefore be narratives without plot, but there cannot be any narratives without a human (anthropomorphic) experiencer" (13). Herman (2002: 85–6) defines "narrativehood," his term for the difference between narratives and non-narratives, using scripts. As scripts represent only stereotypical and expected information, the gaps in a text which a script can supply are not unique and hence do not produce narratives in their own right. By contrast, where a gap cannot be filled by stereotypical information, it "focus[es] attention on the unusual and the remarkable" (90) and requires a narrative explanation. For Herman, narrativehood is a binary distinction in

contrast to the scalar nature of narrativity, the property of being more or less prototypically a narrative. He argues (91) that maximal narrativity is achieved by balancing the appropriate amount of “canonicity and breach,” using Bruner’s (1991) terms. If the majority of events in a story are too stereotypical, they will be untellable and/or uninteresting, but if events are too unusual, the text may not readily be interpreted as a story. Hühn & Kiefer (2005) use the term “eventfulness” for deviations from scripts, viewing these deviations as both unexpected events and instances when an expected event does not occur (Hühn → Event and Eventfulness [3]). For them, deviations must be judged by viewing sequences in the context of cultural and historical factors, using schemata to assess the degree of deviation (see also Hühn 2010).

Another important theoretical contribution of schema theory lies in discussions of literariness. Cook (1994) has defined “literariness” as “discourse deviation,” stating that a narrative acquires literary status when it “bring[s] about a change in the schemata of a reader” (182). Cook sees literary discourse as “schema refreshing,” meaning that old schemata may be destroyed, new ones constructed and that new connections may be made between existing schemata (191), in contrast to “schema preserving” or “schema reinforcing” forms of discourse. His theory echoes the Russian formalist idea of defamiliarization as an essential aspect of literary writing and comprehending. Cook’s definition is controversial because texts which are not literary may nevertheless disrupt existing schemata, as Cook himself admits (47, 192) in relation to journalism, science writing and conversation. In addition, Semino (1997: 175) argues that literary texts can both challenge and confirm existing beliefs, suggesting a scale of schema refreshment for those which are challenging. This does, however, depend on the historical period: during medieval times, confirmation seems to have dominated, whereas in modern times deviation is generally more prominent (see Lotman’s ([1970] 1977: 288–96) concepts of “aesthetics of identity and opposition”). Jeffries (2001), though, highlights the extent to which particular sub-cultures nowadays may still delight in “schema affirmation,” her term for a reader’s “thrill of recognition” of familiar experience in literary texts. A different perspective on the role of schemata is provided by Miall (1989), who argues that it is a reader’s emotions that primarily help the reader make sense of a defamiliarizing literary text, suggesting that affect is primary in reading and that emotions drive the construction of new schemata rather than being an after-effect of cognitive processing.

One major use of schema theory has been in the description of “mind style” (Fowler [1986] 1996) by stylisticians, who use linguistic analysis to study the thought representations of characters who have difficulty comprehending the world around them, such as primitive humans, the mentally impaired, and those alien to a culture

(see Semino 2006 for a summary). Often the technique used by writers is to under-specify (Emmott 2006) the references to key aspects of the focalizing character's context so that the character's lack of understanding is conveyed, but nevertheless writers still need to give readers enough clues to construe the situation by using familiar schemata. Palmer (2004) goes beyond the focus on special types of mind style by suggesting that all fictional minds need to be cognitively constructed by means of "continuing-consciousness frames" in order to bring together diverse mentions of the thoughts of individual characters and groups of characters throughout a story.

In addition to the above theoretical and descriptive uses, the notion of schemata has an extremely wide range of applications in narrative studies. In feminist stylistics, Mills (1995: 187-94), has used it to challenge the sexist schemata that she claims are needed to read some literary texts written by men. In humor studies, oddly incongruous frames are often regarded as the source of humor (e.g. Semino 1997; Hidalgo-Downing 2000; Simpson 2003; Ermida 2008). In detective and mystery stories, clues can be buried by making descriptions heavily schema consistent, then subsequently highlighted by adding information over and above the schema (Alexander 2006; Emmott et al. 2010). In the analysis of science fiction (Stockwell 2003) and absurdist texts (Semino 1997; Hidalgo-Downing 2000), schema theory can explain how alternative and bizarre worlds are created. In educational psychology, schemata and scripts explain how children develop their storytelling and comprehension skills (e.g. McCabe & Peterson eds. 1991). In film studies (Kuhn & Schmidt → Narration in Film [4]), schema theory has been used in discussions of text coherence, genre, and character construction (Bordwell 1989: 129-95; Branigan 1992 : 1-32). This list is not intended to be comprehensive, but gives an indication of the importance of schema theory across a number of areas.

In recent years, the emphasis within the cognitive study of narrative has shifted somewhat (Herman → Cognitive Narratology [5]). Schema theory is still viewed as important, but there has been a growing interest in how a reader needs to supplement general knowledge with the knowledge accumulated from the text itself. So readers will normally gather together a large store of information about characters and contexts as they read a text. Emmott (1997) calls this "text-specific knowledge" and argues that readers must not only build mental representations (termed "contextual frames") using this knowledge, but update these representations where necessary and utilize the information at later stages in a text. Similar ideas can be found in Gerrig's (1993) examination of narrative worlds, Werth's (1999) text world theory, and Herman's (2002) study of storyworlds.

## **4 Topics for Further Investigation**

(a) The inter-relation between schema knowledge and other knowledge (e.g. expert, autobiographical, and text world knowledge) needs to be explored further and built into an overall model with empirical testing of texts which are more complex than traditional psychological and Artificial Intelligence materials. (b) More psychological research is needed to establish how generic knowledge derived from the real world is utilized in building counterfactual worlds, since the findings from current empirical work are not consistent (Nieuwland & van Berkum 2006; Ferguson & Sanford 2008; Sanford & Emmott 2012). (c) There needs to be additional investigation of how readers use schemata similarly or differently in reading factual and fictional texts. (d) Frames based on “intertextual knowledge” (Eco 1984; Genette [1982] 1997) need further empirical study.

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