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LOGIC, HUMOR PROCESSING, EXPECTATION AND SCRIPTS

The study focuses on aspects of humor processing such as script and expectation to explore logic as processing in a new way. The study gives a few assumptions. If one considers logic in terms of frames, one finds that logic works with scripts, i.e., with a certain type of consciousness structure (or human cognitive apparatus) that performs special tasks in natural language processing, namely, the description of familiar situations as stereotypical changes of events and, thus, the function of a set of expectations about what should happen next in the perceived situation. Demonstrative reasoning of the rigorous truth-deduction type is based on the fact that an expectation is guaranteed to be justified; and plausible reasoning is based on the fact that there is no guarantee that the expectations inherent in the premises will be justified (the same is true of heuristic reasoning). Logic (and, seemingly, heuristics), considered through the prism of scripts (and frames), examines the possibilities of making certain human cognitive actions automatic by cutting off secondary mental events to produce controllable situations. Humor processing can be viewed as a deliberate violation of logic in some contexts, and the so-called “logical mechanisms” of humor processing can be viewed as specific mechanisms for violating logic.

Keywords: *expectation, heuristics, humor, joke, logic, script.*

This paper presents a study that continues a line of my research on humor and logic. In previous papers [Раїхер 2020; Раїхер 2021] I have focused my attention on the so-called ‘logical mechanisms’ of the humor process. In the current paper, I will **focus on other aspects of the humor processing, primarily scripts and expectation, and attempt to explore logic as a processing in a new light.**

Conceptually, contemporary neuroscientists and cognitive scientists recognize two elements or processes within humor: cognitive and affective¹. The researchers consider the ability to comprehend and appreciate humor a vital aspect of human social functioning and a significant element of the human condition from an early age.

Cognitive element, also known as ‘humor detection’ and ‘cognitive humor processing’, refers to an understanding or a comprehension of a joke. Cognitive element is characterized by the perceiver’s attempts to comprehend the disparities between punch line and past experience of the perceiver: the punch line contradicts the perceiver’s past experience, her/his/their habit world-view and habit dealing with the surroundings. At the level of the nervous system cognitive humor processing involves the biological neural circuitry (the networks of neurons interconnected by synapses to carry out specific functions when they are activated). In general, research on cognitive humor processing involves the use of functional magnetic resonance imaging (fMRI) to detect the

neural correlates associated with how a human being processes something that is considered 'humorous' [Moran 2003].

Affective element, also known as 'humor appreciation' and 'affective humor processing', refers to the enjoyment of a joke and the production of emotional responses that depend on the perceived hilarity of the joke² [Moran 2003]. Some researchers call those emotional responses an 'elaboration' [Chang 2023].

One group of humor theories focuses on the concept of incongruity in jokes. This group bases its researches on the idea that humor can be seen as the result of a recognition of incongruity followed by its resolution. Incongruity is essentially conceptualized in the same way as surprise. Surprise deals with the emotional aspect of the humor process, whereas incongruity deals with the cognitive aspect of the humor process: "[i]ncongruity is a stimulus, and surprise is a response" [Attardo 2014: 383]. There are different approaches to understanding surprise: "[I]t has been conceptualized as a contrast between expectations and experienced stimuli, as a reaction to the improbable nature of an event, as the failure to "make sense" of an event, as the degree of change between prior beliefs and beliefs after the stimulus, as the degree of difficulty in integrating an event with prior beliefs, and as the detection of discrepancies between schemas (aka scripts or frames)" [Attardo 2014: 383]. As Salvatore Attardo points out, "the definitions of incongruity used in humor studies do not differ from those of surprise. They can be generalized as divergence from expectations" [Attardo 2014: 383].

Within this group there is the General Theory of Verbal Humor developed by Salvatore Attardo and his collaborators and based on the Victor Raskin's Semantic Script Theory of Humor. According to the General Theory of Verbal Humor, five knowledge resources can be added to script-based text descriptions:

(1) *logical mechanism* ("the way in which the two scripts in the joke are brought together, the pseudological reasoning in a text" [Attardo 2014: 456]);

(2) *situation* ("the textual materials evoked by the scripts of the joke that are not necessarily funny" [Attardo 2014: 456]);

(3) *target* ("a stereotypical individual or group from whom humorous behavior is expected" [Attardo 2014: 456]);

(4) *narrative strategy* ("the rhetorical structure of the text, such as the riddle, 1-2-3 structure, question and answer, or other" [Attardo 2014: 456]);

and (5) *language of the joke* ("the actual lexical, syntactic, and phonological choices at the linguistic level that instantiate all the other choices" [Attardo 2014: 456]).

Of all the resources listed, the most important for understanding the concept of joke incongruity is the logical mechanism. This is because logical mechanism corresponds to the phase of the resolution of incongruity. The script opposition corresponds with the incongruity phase of the joke processing. The latter is what the Victor Raskin's Semantic Script Theory of Humor brings into the General Theory of Verbal Humor. According to the Raskin's theory, any text

containing a joke is compatible, either fully or partially, with two different scripts that overlap and oppose each other: “To simplify the matter, if a text activates two different situations that a person is aware of, and some kind of oppositeness between these situations is found, the text satisfies the linguistic criteria to be a joke” [Attardo 2014: 455].

A script is a type of mind structure that executes a specific task in processing natural language. It is a frame that serves a particular purpose [Lehnert 1980: 85]. It is “a sequence of events that are associated with the constituent word meanings and evoked by specific words” [Attardo 2014: 455]. Scripts are descriptions of ordinary situations that follow a stereotypical sequence of events. Scripts are associated with the automaticity typical of human behavior when the mind abstracts from minor mental events. Scripts are concerned with maintaining continuous inner tension, explicitly checking intentions and opinions, and constantly striving for self-control [Audi 1988: 23].

Also, a script can be considered as a set of expectations about what should happen next in the perceived situation [Schank 1990: 7]. Many situations in life can be interpreted as if the participants are playing specific roles. For example, the lecturer follows the role of the lecturer, and the student follows the role of the student. Life experience often provides knowledge of how to act in stereotypical situations and how others will act too. This knowledge is called ‘scripts.’

Victor Raskin developed the theory that intentional verbal humor is based on deliberate ambiguity. However, ambiguity alone is insufficient for humor; the opposing scripts must be unexpected. If both scripts are anticipated, the text will not be found humorous. Let’s consider the following example: “Rene Descartes walks into a bar. A bartender asks, ‘Would you like a drink?’ Descartes replies, ‘I do not think so,’ and disappears.” This joke contains at least three associated scripts. The first describes entering a bar and conversing with a bartender, which is a typical situation even for jokes. The second is associated with the common phrase “I do not think so,” which means “I do not believe it is correct.” The third one is associated with the famous quote by René Descartes, “I think, therefore I am.” This quote represents Descartes’ philosophy and argument against doubt.

Salvatore Attardo suggests that the association of opposing scripts can create incongruity in a joke, but this incongruity can be resolved through the use of ‘logical mechanisms.’ For instance, the joke about Descartes in the bar employs the referential ambiguity mechanism: the joke plays with the meaning of the common phrase “I do not think so” and the meaning of Rene Descartes’ quote “I think, therefore I am (or I exist).” Other logical mechanisms, such as figure-ground reversal, paralogism, chiasmus, analogy, false analogy, false priming (also known as garden path), ambiguity, or homonymy, have been identified by Salvatore Attardo and other researchers [Attardo & Raskin 1991: 303–307]. These logical mechanisms work to resolute the incongruity of jokes, which constitute what Sigmund Freud called ‘sense in nonsense,’ or what Avner Ziv referred to as ‘faultry’ or ‘local logic,’ in their plot, functioning only on

account of a “willing suspension of disbelief” [Attardo & Raskin 1991].

To Salvatore Attardo, the logical mechanism is a way of resolving the incongruity brought about by the overlapping of several scripts in the creation of a joke. Without a resolution, and thus without a logical mechanism, according to Salvatore Attardo, a joke is quite simply impossible. The proponents of Salvatore Attardo's theory, Andrea C. Samson, Stefan Zysset, and Oswald Huber, understand the logical mechanism as a conceptual rule: “A cognitive rule has to be found to bring two incongruous scripts together” [Samson 2008: 126].

The concept of conceptual rule was borrowed by Andrea C. Samson, Stefan Zysset and Oswald Huber from Jerry M. Suls: “It is suggested here that a joke or cartoon is found to be funny as the result of a two-stage process. In the first stage, the perceiver finds his expectations about the text disconfirmed by the ending of the joke or, in the case of a cartoon, his expectations about the picture disconfirmed by the caption. In other words, the recipient encounters an incongruity – the punch line. In the second stage, the perceiver engages in a form of problem solving to find a cognitive rule which makes the punch line follow from the main part of the joke and reconciles the incongruous parts. A cognitive rule is defined as a logical proposition, a definition, or a fact of experience. The retrieval of such information makes it possible to reconcile the incongruous parts of the joke. Although it is difficult to assemble these cognitive rules into a system, they appear to be part and parcel of the cognitive apparatus. The perceiver must proceed through these two stages to find the joke funny. More succinctly, humor derives from experiencing a sudden incongruity which is then made congruous” [Suls 1972: 82]. Jerry M. Sul's approach to studying jokes allows Andrea C. Samson, Stefan Zysset and Oswald Huber to regard jokes as containing incongruous elements that must be resolved in order to understand the punch line [Samson 2008: 125], to distinguish a stage of incongruity detection and a stage of incongruity resolution [Samson 2008: 125], and to view incongruity resolution as “similar to a problem-solving process” [Samson 2008: 26].

The paper of Andrea C. Samson, Stefan Zysset and Oswald Huber contains the interesting sentence: “Although recent fMRI studies on humor have begun to elucidate cognitive and affective neural correlates, they weren't able to distinguish between different logical mechanisms or steps of humor processing, i.e., the detection of an incongruity and its resolution” [Samson 2008: 125]. In this sentence the authors of the paper converge logical mechanisms and steps of humor processing. This leads me to suggest that the process of humor can be thought of as a kind of interference in which the first step (the detection of incongruity) is similar to a premise (or premises) and the second step (the resolution of incongruity) is similar to a missed conclusion. So, the humor process is similar to an enthymeme with a missed conclusion that has to be reconstructed by a recipient of the joke and resolved as a laugh [Ραϊχερτ 2020: 79].

All this enabled me to assume that common logical mechanisms underlie

problem solving, logical inference, riddles, paradoxes, and jokes. Yet I did not pay attention to scripts and their possible connection with the tools of cognition, such as logic.

It was noted earlier that scripts are types of frames that are involved in describing familiar situations as stereotyped changes of events and that act as sets of expectations about what should happen next. This is similar to what logic, or rather demonstrative reasoning within logic, does. Let's take the classic example of Aristotle's simple categorical syllogism:

"All men are mortals.

Socrates is a man.

Therefore, Socrates is mortal."

One can say that in this example one is dealing with scripts describing stereotypical situations: "All men are mortals" is a familiar knowledge about the world (people, as a rule, do not question this claim, although it is not empirically confirmed). Then, added to this habitual information is the claim that Socrates is a man. Once these two claims are associated, the expectation arises that Socrates turns out to be mortal. A rigorous truth-deduction guarantees to the reasoner in such a case that the expectation will be fulfilled, especially under the light of the rules and schemes of this deduction.

The mentioned example may give the idea that demonstrative reasoning works with a single script: "All men are mortals" can be formalized like this: "All x are y ," "Socrates is a man" like this: " z is x " and "Socrates is a mortal" like this: " z is y ." Here z is included into x , and so it is included into y . Deduction works with or within this script. There is no challenge here to justifying expectations: if all humans are mortal and Socrates is a human being, then Socrates is necessarily mortal.

Generalized, demonstrative reasoning works with certain types of mind structures that perform special tasks in natural language processing. There, the expectations that are induced by the premises are always justified in the conclusion. Therefore, it makes no sense to talk about the occurrence of an incongruity and the resolution of that incongruity in such cases, because even if there is some incongruity, it is quickly resolved through demonstrative reasoning.

Beyond demonstrative reasoning, however, logic deals with plausible reasoning. Take the case of incomplete induction as an example:

"The first swan is white.

The second swan is white.

The third swan is white.

Therefore, all swans are white."

There is also an expectation here: after the reasoner has encountered only white swans, he/she/they concludes that all swans are white. However, this conclusion is not guaranteed by the premises and the expectation may not be fulfilled: a black swan may be encountered and the conclusion will be false. The latter shows that either incomplete inductive reasoning will turn out to operate

with a single script (all swans may turn out to be expectedly white), or there will be an overlapping of one script (“There are white swans”) with another script (“There are black swans”).

To put it another way: here one is dealing with an indefinite number of scripts: it may turn out that the inductive reasoning is correct – and then it turns out that the reasoning was carried out within the framework of one script (“All swans are white”); one may even suppose that it was the finding or reconstruction of this very script (so to speak “searching for a common script” or “pattern/regularity”³). Or it may turn out that this inductive reasoning is not correct: black swans may happen – and then we will have two scripts: “There are white swans” and “There are black swans.” Here we already have an incongruity, which is quite difficult to resolve if one tries to find a universal scheme “All *x* are *y*.” The resolution can only be a fixation that there are 2 scripts in this situation: “Some *x* are *y*” and “Some *x* are *z*,” where *x* is swans, *y* is white, and *z* is black.

In any case, incomplete inductive reasoning offers a wait-and-see expectation: it may someday turn out that the inductive inference here was either correct or incorrect. Basically, there are an expectation and an incongruity there, but the resolution of the incongruity is deferred to the future.

In terms of the simple structure of a joke, incomplete inductive reasoning has a setup but no punch line, unlike demonstrative reasoning, which has both a setup and a punch line. In this comparison, incomplete inductive reasoning is like an absurd joke. An example of an absurd joke is the following: “Why did the elephant sit on the marshmallow?” “Because he didn’t want to fall into the cup of hot chocolate.” [Chapman 1977: 37] Elliott Oring⁴ says that “[t]he joke is incompletely resolved in their opinion, because the situation is incompatible with the world as we know it. Certainly, elephants do not sit in cups of hot chocolate.” [Oring 2003: 21].

However, that comparison works when it comes to the simple structure of a joke. Researchers Chia-Yueh Chang, Yu-Chen Chan and Hsueh-Chih Chen suggest that “setup involves the generation of the schema of the reader’s expectations; therefore, setup usually represents the process of expectation. The punch line includes the perplexity and resolution caused by the violation of expectations and the appreciative feelings and pleasant responses generated after comprehension; therefore, the punch line usually comprises three processes: incongruity, resolution, and elaboration. In other words, in the correspondence between the humor structure of two-element jokes and the stages of humor processing, the first element is the setup, corresponding to expectation; the second element is the punch line, corresponding to incongruity (i.e., surprise), resolution, and elaboration (i.e., amusement)” [Chang 2023: 417]. In this case, elaboration is a feeling that is induced by the resolution of an incongruity (amusement, hilarity, laughter, etc.). They go further and suggest that a joke can be made of three elements: setup (expectation), first punch line (incongruity) and second punch line (resolution and elaboration).

In light of Chia-Yueh Chang, Yu-Chen Chan and Hsueh-Chih Chen's conception, incomplete inductive reasoning looks like a setup, a first punch line (a tentative conclusion) and a delayed second punch line (a possible confirmation or refutation of the tentative conclusion in the future).

Similar things can probably be said of other kinds of plausible reasoning, such as inference by analogy or abduction⁵. For illustration, let us take a textbook instance of attributive analogy (inference by analogy on the basis of similarity of properties): notwithstanding all human successes in space exploration, the Earth is easier to explore than, suppose, Mars. Thus, the reasoner can confidently claim that the Earth is inhabited. Knowing this, one can conclude that there is life on Mars, but only on the basis of common properties of Earth and Mars, such as being a planet, having alternation of day and night, seasons, water. The reasoning (or inference) by analogy here shows the Earth as a model, from which information is transferred to Mars, which appears as a prototype (sample/original). Such reasoning is also plausible. It is also not a certainty here that there is life on Mars. We can also assume that in the case of attributive analogy there is "finding some pattern/regularity" and/or discovering/reconstructing some script, e.g., "All planets with such and such properties are inhabited."

And now here is a classic instance of abduction proposed by Charles Sanders Peirce: there are white beans in front of us. There is a bag containing white beans. From these two reports, it is inferred that the white beans that lie before us are taken from the bag in question. This conclusion may be true, for the white beans will indeed be from the given bag, or it may be false, for the white beans may be taken from another place. In the case of abduction, it is no longer a matter of "finding some pattern/regularity" and/or discovering/reconstructing some script, but rather of confirming it.

So, in the context of the theory of scripts, what do one have? What one has is the following: demonstrative reasoning like rigorous deductive reasoning is working with one (single) script, within which the expected result will turn out to be real, and plausible reasoning like incomplete induction, inference by analogy or abduction is working with a script in a situation of uncertainty: when one doesn't know whether one will remain within the initial script or whether there will be an overlapping of one script with another, i.e., expectations will not be fulfilled in the end and there will be some surprise at the end.

I would further point out that a similar situation with scripts probably occurs in the case of heuristics. Rüdiger Inhetveen in his paper "Heuristic and Analogies in the Technical Sciences" [Inhetveen 1984] considers that argument can be used heuristically if it is used to "justify" the next step in a situation in which that next step is determined by not only the awareness of the other choice would give you a failure result. Some heuristic arguments can be used more than one time and that's why they can be transformed into the rules, but not the rules of rationality because they don't guarantee a successful result; they give the ground for expectation only. I would add that if heuristic arguments start

providing guaranteed results, they will turn into logical ones.

Rüdiger Inhetween points out that heuristics deals with expectation as well. For example, such a heuristic means of problem solving as a rule of thumb suggests using as a means of solving a particular problem an established method that seems to the problem solver to be close to a possible method in a given uncertain situation. The use of this method generates expectations that will either be justified or not. Given that the use of this method is justified by heuristic reasoning (rule of thumb), we can say that scripts may also be present here and there can be either operating with one (single) script or an overlapping one script with other one.

However, it should be emphasized that there is still a significant difference between a joke, on the one hand, and plausible and heuristic reasoning, on the other. For a joke, overlapping one script with another is one of the elements of resolving incongruity, since the joke is interested in causing laughter, or at least hilarity. For logic and heuristics, the overlapping of one script with another is a sign of the failure of reasoning: here, an incongruity is asserted between the premises, which set certain expectations, and the conclusion.

Conclusions. Based on the aforesaid, I can draw the following assumptions. If one recognizes that frames, including scripts, do exist, and considers logic in terms of frames, one will find the following:

first, logic works with scripts, i.e., a certain type of consciousness structures (or human cognitive apparatus) that performs special tasks in natural language processing, namely, the description of familiar situations as stereotypical changes of events and – due to this – the function of a set of expectations about what should happen next in the perceived situation;

second, demonstrative reasoning of the type of rigorous truth-deduction is based on the fact that an expectation is guaranteed to be justified (i.e., in demonstrative reasoning, the premises constitute sets of expectations that will necessarily be justified in the conclusion);

third, plausible reasoning is based on the fact that there is no guarantee that the expectations inherent in the premises will be met (the same is true of heuristic reasoning);

fourth, demonstrative reasoning works with already defined scripts, while plausible reasoning and heuristic reasoning deal with finding, discovering, establishing, and confirming scripts, i.e., they make them definite.

As such, logic (and, apparently, heuristics), when viewed through the prism of scripts (and frames) explore the possibilities of automatizing certain human cognitive actions by cutting off secondary mental events in order to establish controllable situations, because that's what script theory is all about [Audi 1988: 23].

If these assumptions are correct, it is possible to look at the humor processing as an intentional violation of logic in some contexts, and at the so-called “logical mechanisms” of the humor processing as mechanisms for violating logic.

Notes

¹ Although researchers separate the cognitive and affective elements in the humor processing, it is still believed that the cognitive element is an integral part of the affective element [Chang 2023].

² There is a very intriguing parallel between the humor processing and the problem-solving processing [Wu 2020]. Indeed, both can be conceptualized as consisting of two sub-processes: cognitive and affective, with the former as embedded in the latter. The basic “aim” of the humor processing is to cause the so-called “Ha-ha effect” (that is, the same laughter, amusement, and hilarity) as a response to a joke. This “Ha-ha effect” resembles the so-called “A-ha effect,” also known as the “A-ha moment,” “Eureka effect,” and “Eureka moment” and considered as a type of insight (or epiphany) [Auble 1979; Danek 2013].

³ Complete induction is great for “searching for a common script” or “pattern/regularity:” essentially, complete induction is concerned with finding and establishing patterns and regularities by enumerating all cases and instances.

⁴ Elliot Oring defined humor as not the resolution of incongruity, but “the perception of appropriate incongruity” [Oring 2003: 14] that all jokes contain a certain amount of incongruity, and those absurd jokes require the additional component of an “absurd image,” with an incongruity of the mental image [Oring 1992: 21–22].

⁵ They also appear to be closely related to the joke in this respect. It is important that analogy is one of the logical mechanisms for resolving incongruity in a joke [Attardo & Raskin 1991: 303–307].

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Костянтин Райхерт

ЛОГІКА, ГУМОРНІЙ ПРОЦЕС, ОЧІКУВАННЯ ТА СКРИПТИ

Дослідження фокусується на таких аспектах гуморного процесу, як скрипти і очікування, щоб по-новому вивчити логіку як процес. У дослідженні зроблено кілька припущень. Якщо розглядати логіку в поняттях теорії фреймів, то виявляється, що логіка працює зі скриптами, тобто з певним типом структури свідомості (або когнітивного апарату

людини), який виконує особливі завдання під час оброблення природної мови, а саме опис знайомих ситуацій як стереотипних змін подій і, таким чином, функцію набору очікувань щодо того, що має статися далі в сприйнятій ситуації. Демонстративні міркування типу строгого дедуктивного виведення ґрунтуються на тому, що очікування гарантовано виправдовуються; а правдоподібні міркування ґрунтуються на тому, що немає гарантії, що очікування, закладені в засновках, виправдаються (те ж саме стосується і евристичних міркувань). Логіка (та, мабуть, евристика), розглянута крізь призму сценаріїв (і фреймів), вивчає можливості автоматизації певних когнітивних дій людини шляхом усунення вторинних ментальних подій для створення контрольованих ситуацій. Гуморний процес можна розглядати як свідоме порушення логіки в деяких контекстах, а так звані «логічні механізми» гуморного процесу можна розглядати як специфічні механізми порушення логіки.

Ключові слова: гумор, евристика, жарт, логіка, очікування, скрипт.

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