ANNALI
di storia dell'esegesi

39/1
2022

Network Science in Biblical Studies

EDB

ANNO XXXIX, N. 1, GENNAIO-GIUGNO 2022
SEMESTRALE – € 37,20
Poste italiane S.p.A. – Spedizione in abbonamento postale
Aut. MBPA/CN/BO/0010/2016 – Periodico ROC

ANNALI di STORIA dell'ESEGESI

Rivista semestrale
www.asejournal.net

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Tutti gli articoli sono sottoposti al processo di *peer-review*.

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Annali di Storia dell'Esegesi è indicizzato in: Année Philologique; ATLA Religion Database; Australasian Union List of Serials in Theological Collections; Index of Jewish Articles; Index Theologicus (IxTheo); Italian Bibliography of the History of Science; New Testament Abstracts; Old Testament Abstracts; Scopus.

Direttore responsabile: Alfio Filippi.

Abbonamento annuo (2022): Italia € 66,50 – Italia enti € 83,00 – Europa € 92,50 – Resto del mondo € 97,50 – Una copia € 37,20.

Versamento sul c.c.p. 264408 intestato al Centro Editoriale Dehoniano – Bologna.

Editore: © Centro Editoriale Dehoniano – Via Scipione Dal Ferro 4 – I-40138 Bologna.

Redazione: Cristiana Facchini, Dipartimento di Storia Culture Civiltà, Piazza San Giovanni in Monte 2, I-40124 Bologna.

Anno XXXIX – n. 1 – gennaio-giugno 2022.

Amministrazione e Ufficio abbonamenti: Tel. +39.051.3941255, Fax +39.051.3941299; e-mail: ufficio.abbonamenti@dehoniane.it

Registrazione del Tribunale di Bologna n. 5825 del 24.01.1990.

ISSN 1120-4001 ISBN 978-88-10-13021-6 *Stampa*: LegoDigit s.r.l. Lavis (TN) 2022

Contents

Roberto Alciati, Luca Arcari, Cristiana Facchini,
Emiliano R. Urciuoli, *Editoriale* 7

Network Science in Biblical Studies

István Czachesz, *Network Science in Biblical Studies: Introduction*..... 9

Abstract: This article introduces the special issue of ASE on network science and biblical studies. After a short presentation of network science and the concept of networks, the article discusses the application of network science in three domains: the natural and built environment of ancient Judaism and Christianity, the social networks of Jewish and Christian actors, and the analysis of textual corpora. In the next part, some technical terms of network science are clarified. The introductory article concludes with the presentation of the contributions to the special issue.

Keywords: Network Science, Social Network Analysis, Network Analysis of Texts, Historical Network Analysis, Vector Semantics

Catherine Hezser, *Between Scholasticism and Populism: Rabbinic and Christian Networks in the Roman Empire*..... 27

Abstract: Between the first and fourth centuries C.E. networks of like-minded individuals who shared certain religious beliefs and practices developed in both Jewish and Christian society. These networks emerged in the context of Roman imperialism which connected, integrated, and to some extent homogenized the various sectors of the population through road connections, infrastructure, and Romanization. Both rabbis and Christian leaders tried to distinguish themselves from certain aspects of their Graeco-Roman cultural environment by, at the same time, functioning within it and adopting some of its features. This study compares rabbinic and Christian leaders' networking activities within the shared Roman imperial context of the first centuries C.E.

Keywords: Rabbis, Bishops, Imperialism, Romanization, Communication, Travel

Rikard Roitto, *The Johannine Information War: A Social Network Analysis of the Information Flow Between Johannine Assemblies as Witnessed by 1-3 John*.... 47

Abstract: Social network analysis is applied heuristically to understand how the Epistles of John attempt not only to promote their vision of the community's identity and theology, but

also to strengthen their own position in the Johannine social network and weaken the position of its competitors. Insistence on social distance from competing teachings is central to 1 and 2 John, while 3 John is occasioned by the Johannine School being marginalized by an assembly. The errands of these letters can be described in terms of network analysis as attempts to weaken certain social ties and strengthen others to allow the Johannine School more uncontested dispersion of information in the assemblies of the network.

Keywords: Epistles of John, Social Network, Johannine Community, Network Theory, Information Flow, Conflict

Sean F. Everton, Rob Schroeder, *The Church Among Jews and Gentiles: A Network Simulation of the Christian Mission to the Jews* 63

Abstract: How successful was the Christian Church's mission to the Jews? The answer to this is a function of numerous factors, such as underlying demographics, fertility rates, competition, and (most importantly) when Christians and Jews severed their ties with one another. Some believe the split as early as 70 CE, but others present evidence that Jews and Christians regularly interacted until the 4th and possibly 5th centuries. In this paper, using computer network simulations that capture various factors, we run a series of models that estimate the proportion of Jewish converts to Christianity from approximately 40 to 600 CE. Our models suggest that whether one considers the Church's mission to the Jews a success largely depends on what one considers a "success." If one measures it solely in terms of raw numbers, then probably not. However, if one considers that the potential pool of Jewish converts was relatively small compared to Gentiles, it was perhaps more successful than many early Church scholars believe.

Keywords: Social Networks, Network Simulations, Early Church, Mission to the Jews, Jewish Converts

Vojtěch Kaše, Nina Nikki, Tomáš Glomb, *Righteousness in Early Christian Literature: Distant Reading and Textual Networks* 87

Abstract: The article joins the scholarly discussion about the meaning of righteousness language in biblical literature with consideration of changes in the concept from archaic Greek literature to fourth century Christian texts. The article seeks to showcase and evaluate how methods from the area of computational linguistics and distributional semantics can contribute to the discussion. The article suggests that, together with formal network models, namely word co-occurrence networks and similarity networks, the methods reveal changes in large corpora of textual data which are too subtle to be detected by close reading. On the other hand, some questions require or benefit greatly from combining distant and close reading methods.

Keywords: Righteousness, Paul of Tarsus, Quantitative Textual Analysis, Computational Linguistics, Distributional Semantics, Word Co-Occurrence Networks

Tamás Biró, *Who Circumcised Abraham? A Cognitive Network Model for the Interpretations of Gen 17* 121

Abstract: The verb "to circumcise" in Gen 17:24, and elsewhere in that chapter, appears in the niphal form, entailing a passive meaning, and the agent of the action remaining unknown. At the same time, Abraham's circumcision plays a central role in Judaism. It is not simply the prototype of all subsequent instances of a ritual that is central to Jewish identity; but it is also the starting point of a recursive chain of ceremonies by which any later circumcision acquires its religious significance. Hence, the importance of the agent of the first circumcision. First, I describe how this ritual is embedded in the network of concepts, entities, narratives,

precepts and further mental representations in Judaism. Subsequently, I shall present a selection of answers from various traditions to the question posed in the title. Then, I introduce a network of meanings, which shall serve as a linguistic model interpreting the agent-less niphal forms of the verb 'to circumcise' in Gen 17. This model yields different interpretations under various conditions, corresponding to various traditions. Consequently, it is argued to describe the computation taking place in the human mind, which is able to produce alternative interpretive traditions.

Keywords: Circumcision, Judaism, Midrashim, Biblical Exegesis, Anaphora Resolution, Simulated Annealing

István Czachesz, *The Bible as a Network of Memes: Analyzing a Database of Cross-References* 145

Abstract: This article puts forward the theory that the Bible is a network of cultural items (memes) that developed through an evolutionary process and has been transmitted for many centuries in a relatively stable form. Biblical cross-references reveal how the verses and passages of the Bible are connected into a network that is analogous to genetic networks in biology. The article presents a network model of cross-references, based on the *Treasury of Scripture Knowledge*. The article discusses the history of the database and the origin of the references; network statistics that yield insights into the history of the cross-references; node centrality statistics and the popularity of the respective verses in the history of Western biblical interpretation; and the modular structure of the network. The results are interpreted as tentative evidence for the collective behavior of populations in Western history being co-determined by a network of biblical memes.

Keywords: Cultural Evolution, Cross-References, Treasure of Scripture Knowledge, History of Interpretation, Node Centrality, Community Detection

Articles

Giorgio Jossa, *I "voi" di Gesù. Una spia per identificare i destinatari delle sue parole* 181

Abstract: For the gospel passages too, as for any other historical document, it is impossible to interpret their meaning correctly without knowing their context, without therefore assigning them a precise place and time. The scholar of Christian origins is well aware that for the gospels the operation is considered to be mostly impossible, but he cannot resign himself to saying that the original context is irretrievably lost. There are, in fact, a few ways of attempting to recover it. One of these is to try to identify who the recipients of Jesus' words really were; to try in particular to understand to whom Jesus was addressing himself when he said "you". Some gospel pericopes allow this operation.

Keywords: Historical Jesus, Sinoptic Gospels, Exegesis

Brandon E. Bruning, Jessica Ann Hughes, *Sham Synagogues and Fake Jews: Advancing the Thesis of Pauline Pagans at Smyrna and Philadelphia (Rev 2:9, 3:9)* 197

Abstract: New Testament scholars continue to identify the opponents of John of Patmos and his addressees at Smyrna and Philadelphia—despite John's testimony that "they say they are Judeans and are not, but are lying"—as a Jewish "Synagogue of Satan" (2:9, 3:9), not gentile imposters. Since 2001, David Frankfurter has identified the Smyrnean and Philadelphian opponents as "Pauline or neo-Pauline" gentiles who threatened the Jewish identity of John's con-

gregations. This proposal anticipated recent Pauline scholarship wary of Christian theological anachronisms, but the resulting "Paul within Judaism" shares more with Frankfurter's "John within Judaism" than with his "Pauline" foil. Refining Frankfurter's hypothesis to distinguish "neo-Pauline" inheritors from Paul promises a clearer view of John, his disciples, and his adversaries in relation to the contested reception of Paul's instructions for his gentile disciples.

Keywords: Synagogue of Satan, Revelation, Paul, Ephesians, Anti-Semitism

Marius A. van Willigen, *Philo's and Ambrose's Explanation of the Dreams in Gen 37-47* 221

Abstract: The dreams of the patriarch Joseph (Gen 37), the dreams of the butler and the baker (Gen 40) and the dreams of Pharaoh (Gen 41) are significant dream examples in the Joseph-narrative. The Jewish exegesis of these dreams by Philo of Alexandria and the Early Christian exegesis of these dreams by Ambrose of Milan (337-397) will be discussed here. Next, we want to investigate whether Philo's exegesis of the dreams influenced Ambrose's exegesis or whether this is unlikely. Although we know that Philo influenced Ambrose far and wide, his influence on the interpretation of the dreams in the Joseph story seems to have been slight. Further investigation reveals that Ambrose relied on Origen for his exegesis of these dreams. As for the scholarly investigation of the latter, a complicating factor is that Origen's exegesis of Genesis is only partially left.

Keywords: Jewish and Christian Exegesis, Joseph's Dreams, Philo of Alexandria, Origen, Ambrose of Milan, Exegetical Influence

Book Discussion

Discussione del libro di Francesco Benigno, Vincenzo Lavenia, *Peccato o crimine. La Chiesa di fronte alla pedofilia*, Roma-Bari, Laterza, 2021, V + 284 pp. (I Robinson. Letture) 245

Book Reviews 263

ASE 39/1(2022) 121-143

Tamás Biró

Who Circumcised Abraham? A Cognitive Network Model for the Interpretations of Gen 17

Abraham is viewed by Western religious traditions as the forefather of the Abrahamic religions, after having entered into a covenant with God, the symbol of which is his circumcision (Gen 17). Jews, Samaritans, and Muslims perform this ritual to this very day, while its function was a central issue within the early Jesus movement (e.g., Acts 15).

The verb "to circumcise" in Gen 17:24, and elsewhere in the same chapter, appears in the *niphal* form, entailing a medio-passive meaning: "Abraham was circumcised." The agent of the action, if any, is left unspecified. At the same time, Abraham's circumcision plays a central role in all forms of Judaism. It is not simply the prototype of every subsequent instance of the ritual so central to Jewish identity; but it is also the starting point of a recursive chain of ceremonies by which any later circumcision acquires its religious significance. In this chain, the agent of the ritual was once himself the patient of a prior ritual. Hence, the importance of the agent of the very first circumcision.

In this article, I will outline a network model to explore different Jewish interpretations of Abraham's circumcision. A religion can be viewed as a network of phenomena or concepts,[1] such as texts, narratives, beliefs, rituals, entities, identities, and so forth. Please observe the way the previous paragraph combines many of these. A narrative, which includes entities such as Abraham and God, relates the story of Abraham's circumcision and God declaring this act to be the symbol of their everlasting covenant. In turn, this narrative appears in a sacred text, the Hebrew Bible, and hence, the (traditional) believer postulates it to be (historically) true. Moreover, the believer also concludes that he must undergo – or her male relative must undergo – a ritual (at least

[1] Czachesz 2013.

partially) replicating the story in order for him to "enter Abraham's covenant," that is, to maintain his (ethnic? religious?) identity.

Subsequently, I shall return to the question posed in the title. The proto-Karaite Anan ben David, in his *Book of Precepts*, prohibited self-circumcision, which had been the traditional rabbinic interpretation of the Abraham story. A later midrash suggests that Abraham miraculously found himself circumcised. Beside the very much understandable practical reasons... why is self-circumcision rejected by a heretic? A cognitive model, once again related to networks, will provide an attempt to simulate the processes in the exegetes' mind.

I. A network for religious rituals

My working hypothesis is that the human mind entertains representations of mythological figures and stories, prohibitions and rituals, sacred objects and theological concepts, among other (non-religious) pieces of knowledge.[2] These representations, in turn, organize themselves into a network.

Let me immediately clarify some philosophical aspects of this hypothesis. First, I am not necessarily positing symbolic representations of the kinds presented in the early days of the cognitive revolution. The reader is welcome to imagine spatially and temporarily distributed activation patterns in a neural network with bodily effects beyond the brain proper, and so forth.[3] Second, while "the brain as a computer" is purely a metaphor, I contend that it is a useful one for the scientific study of religion. Namely, reproducing observed religious phenomena as the outcomes of "computations" in a model may shed new light on their structures. Third, my working hypothesis does not concern the brain (the physical organ), but the mind (its function). The focus of my article is not the network of brain cells, but two further networks. Here I am describing the first one, leaving the explanation of the second one to the final sections of the article.

Leaving aside the physical, physiological implementation of the above-mentioned mental representations, let us introduce a network model made up of them. These mental representations shall be the vertices of a fully connected network, while their associations (to which

[2] Biró 2021.

[3] For a possible integration of a connectionist and a symbolic cognitive architecture, refer to Smolensky, Legendre 2006. Their approach legitimizes "old-school" symbolic approaches to domains in higher cognition (e.g., language, literature, culture or religion), which we all have been trained to work with, even in an age when we are well-aware of the non-symbolic nature of the brain.

I am returning momentarily) are the edges.[4] I propose that this model can help us analyze various cultural and religious phenomena and reformulate them in a way that will be amenable in the future to cultural neuroscience studies.[5]

The vertices of the network come in two flavors. Some of them are atomic, at least for the purpose of the current study. These include entities and actions, among others.[6] Entities are, for instance, ABRAHAM, GOD, TREE, SUN, KNIFE, FLINT and so forth; whereas actions comprise CUTTING, SPEAKING, SLEEPING, etc.[7] These entities and actions have just been said to be atomic for rhetoric purposes, but they can also be decomposed. For example, KNIFE can include attributes such as *material*, *shape,* and *owner*. Actions, importantly, have an *agent*, a *patient*, an *instrument*, a *reason*, a *goal*, a *location*, a *time*, and many more slots, called thematic roles in linguistics.[8] Indeed, entities and actions are 'atomic' in this model just like atoms are in chemistry: their inner structures can be ignored to some extent, but their valence electrons in chemistry, and their attributes and thematic role slots here, do play a key role in the theory.

Other vertices (narratives, rituals, precepts, prohibitions, etc.) are complex, typically composed of a series of actions (comparable to molecules in chemistry).[9] The protagonist of a story is likely to appear as the agent of many of these actions. Yet, other characters can also fill that slot (thematic role) – as we shall see in the second part of this paper. Beside the recurrent characters, spatial, temporal, and logical links also interconnect those actions. Most narratives are built of actions happening in the past, but eschatologies are located in the future.

Rituals are atemporal actions (or series of interconnected actions); they are conceptual representations in the semantic memory of the believer, which can, however, overlap with autobiographical memory traces ("I remember I have undergone that ritual"). They are often also linked to narratives in a sacred text, re-enacting past events or fulfilling a divine commandment. As it will be explained soon, cir-

[4] For a brief explanation of the basic concepts of network science, see the Introduction to this special issue.

[5] Cf. Biró 2014.

[6] For a more detailed introduction, refer to Biró 2013a.

[7] Small caps shall denote the names of the vertices in the model of the human mind, distinguishing them from the usage of these words outside of the model. Contrast, for instance, the mental representation ABRAHAM to the biblical figure of Abraham. This notation serves as a constant reminder of the fact that we are studying religious phenomena as we model the processes in the mind of the congregant, without any ontological claims in the "real world": either historically (did Abraham exist?), or textually (does the text "really" relate this about Abraham?), or in someone's brain (are there neurons or neural circuits "standing for" Abraham?).

[8] Biró 2013a.

[9] Cf. to any introduction to narratology, e.g., Abbott 2002, 195 (s.v. "Story").

cumcision in Judaism exemplifies both types of connections to the biblical narrative.

While stories are purely in the indicative modality, rituals involve an imperative (deontic) modality. Religious prohibitions, conversely, come with a prohibitive modality. Importantly, in ethically oriented religions, an overlap between a theoretical precept involving a deontic modality ("*you must*" or "*you must not*") and an autobiographical memory ("*I did*" or "*I did not*") shall activate a link to future actions and events (punishment or reward by the divine). Even hypothetical actions ("*what if I did*" and "*what if I did not*") can activate this link, influencing action planning, one of the most important cognitive functions – hence the behavioral, cultural, and social importance of moralizing gods, as argued by several authors in the cognitive science of religion (CSR).[10] Introducing second-order representations (representations of other people's representations), social cognition in the believer's mind will expect co-religionists to also adhere to these precepts and prohibitions.

To sum up, the mental representations of commandments are connected in this network to the mental representations of culturally postulated narratives; which, in turn, are connected to the mental representations of sacred books: either books as texts (again, with a narrative about their origin), or books as objects (connected to rituals). The reader is invited to draw further connections between the vertices of this network (hints: include the origins and tasks of religious specialists, include sacred space and time, include belief systems). Simultaneously, the same representations are also related to cognitive domains beyond religion, such as social cognition and action planning.

This short introduction to the various kinds of vertices has repeatedly referred to connections between the representations. An action has slots (thematic roles) to be filled in with entities, whereas a story consists of actions interconnected by shared agents, a temporal framework, and a logical structure. These links are (partially) responsible for generating the association network of these concepts. It turns out that whenever a believer performs a ritual or hears a passage from a sacred book, a large number of further mental representations are also indirectly activated. By uncovering the network of these representations, I propose we can get closer to understanding the psychological and neural mechanisms underlying religion.[11]

[10] Boyer 2002; Norenzayan 2013.

[11] Cf. Biró 2014, arguing that "[b]ottom-up (neuron-to-phenomenon) and top-down (phenomenon-to-neuron) approaches together aim to understand how information flow in the brain produces the observable abilities of the mind."

II. A Network for Circumcision in Judaism

Let us now describe specifically the network surrounding the ritual of circumcision (*brit milah*) in Judaism. As a first approximation, the word *Judaism* refers here to mainstream traditional rabbinic Judaism (whatever these three adjectives exactly mean), in the present and in the last one or two millennia – but it should and shall be specified more precisely. Certainly, I acknowledge that this article only presents a proof-of-concept, which must be applied to various datasets more thoroughly in the future.

Circumcision is a CUTTING action that involves several slots (thematic roles). The patient (or undergoer) of this action is – in the simplest case – a male BABY, born to a Jewish mother. Here we skip the fascinating questions about how to define *maleness* and *Jewishness* as attributes of a mental representation. The instrument slot of the action is filled by some mental representation KNIFE (or a similar objects), and various sources rehearse some restrictions on its attributes, such as it being *sharp*. Importantly, the KNIFE need not undergo any prior ritual.

The time of the action is, preferably, the eighth day after birth. Encoding this requirement can be done in two different ways. Either the time attribute of the action includes a reference to the patient's age, creating a direct link between these two slots of the action; or the age attribute of the patient is required to be "8-days-old". Since details of the formalism do not concern us here, we shall not compare these options.[12] Suffice it to highlight the direct link between two vertices in the network, connected to two slots (the patient and the time) of the action.

The location of the action can be any place (e.g., the home of the baby), although it is significant that a sacred space – or a space with a religious significance, such as a synagogue – is often chosen. This tendency is noteworthy, as it shows how the system of religious concepts strives to form a close-knit network by developing additional connections when filling the thematic roles. Preferring religiously significant entities as fillers activates further sub-networks, and this has a double effect. Firstly, the present ritual enjoys a stronger influx of activation from other religiously significant elements of the system.[13] Secondly, the autobiographical memory about the current ritual taking place in a particular space would also enhance future rituals at the same location ("this synagogue has a special significance to me as my son was circumcised here"). We conclude that while the theologically correct form of Judaism permits circumcision in any space, intuitive religiosity (and,

[12] Regarding the formalism underlying this train of thought, see Biró 2013a, 129ff.

[13] This would be the translation to CSR terms of what a phenomenologist would describe as the contribution of the numinous in a sacred space to the experience of a religious ritual.

hence, popular forms of religion) might have a propensity to place it at religiously significant locations,[14] bringing about a more interconnected (i.e., closer-to-optimal?) system.[15]

The tradition of placing the baby for a moment on the *Chair of Elijah*, a richly carved and ornamented piece of furniture at the right of the sandak (the godfather, who subsequently holds the baby on a pillow on his knees during the circumcision), is another example. The extended ritual of circumcision (i.e., a series of actions and events: UTTERING certain liturgical formulas, PLACING the BABY here and there, etc., beside the CUTTING action itself) thus contains an action with a location slot that is explicitly associated with a biblical figure.

In turn, the mental representation ELIJAH has connections to various vertices in the network of Judaism. First, Elijah is considered the herald of the coming messiah (cf. Mal 3:23), a piece of information activated in a few Jewish rituals (e.g., on seder night and Saturday night havdalah). But he is also considered the protector of the children, based on the biblical narrative about Elijah reviving a child (1Kgs 17:17-24), and reified in protective amulets.[16] Thus, the location slot of a short episode during the ritual – the placing of the baby boy on the Chair of Elijah – activates a multitude of seemingly unconnected vertices in the religious network: texts (MALACHI3, 1KINGS17), concepts (MESSIAH, REDEMPTION, GOD), rituals (SEDER, HAVDALAH) and objects (CHAIR-OF-ELIJAH, CUP-OF-ELIJAH, AMULET), just to name a few. Finally, these vertices may be connected to further ones, thus also indirectly activated, some of which may even be unrelated to Judaism (JOHN SMITH, the carpenter who fixed Elijah's chair last week; the SMELL of the Havdalah spices; a personal memory about last year's seder, or about my Sunday school teacher telling me the stories of Elijah; a message I have to send to my colleague Eli Smith; etc.). Impor-

[14] A similar logic explains the bitter fight between the modernists and the orthodox in nineteenth century Hungary over the place of the wedding ceremony. While in other countries it could take place in the synagogue, open-air weddings had been the local custom in Eastern-Europe. The modernists – with an increasingly secularized lifestyle – would find it more appropriate to marry in a sacred space, and so they changed the local tradition. Yet, the orthodox adhered to the "theologically correct" option (the tradition), as they perceived a lesser contrast between "sacred" and "profane" spaces (due to their many rituals outside of the synagogue, and due to their frequent presence in the synagogue, also involving non-ritual activities).

[15] I conjecture that a large proportion of the participants in a survey would agree with statements such as "a circumcision must be performed in a synagogue" or "a circumcision is preferably performed in a synagogue." Orthodox and non-orthodox participants would bring different arguments, but they would still convey the same message: a place with some level of sanctity (originating in various factors) is the preferred place for performing a commandment. This folk view, in turn, percolates into religious literature, reshaping the theologically (halakhically) correct forms of rabbinic Judaism, rendering the borderline between *halakhah* (religious law) and *minhag* (custom) permeable.

[16] E.g., Folmer 2007.

tantly, some of these associations come with (good or bad) emotions, including bodily effects, physiological processes accompanying and reinforcing the mental procedures.

III. The agent of the circumcision

Let us now return to the thematic slots of the CUTTING action, namely, to its agent. Malley and Barrett report the results of a survey:

> Our informants … seemed to think that the mohel [a person trained to perform the circumcision in lieu of the father] was necessary. They were uncertain as to the procedure by which a person became a mohel but seemed to regard mohels as a special class of person, uniquely eligible to carry out the bris [circumcision]. The tradition of the bris extends, in Jewish mythology, back to Abraham, who was the agent of the first circumcisions (including his own). We therefore interpret the bris as a special-agent ritual.[17]

This popular view should be contrasted to the halakhically correct view in (standard, normative, contemporary) rabbinic Judaism. Quoting the highly influential twelfth-century law code of Moses Maimonides, repeated in the *Shulhan Arukh* (Yore De'a 264.1), the sixteenth-century code of Joseph Caro, determining orthodox Jewish life even today:

> Everybody is allowed to circumcise. Even the uncircumcised, the slave, the woman and the minor may circumcise, if there is no man present. But the gentile may not circumcise; yet, if he did so, one does not need to circumcise again.[18]

In theologically (halakhically) correct terms, the agent slot of the circumcision ritual is not restricted. In retrospect, even the circumcision by a gentile is valid, even if it is not the preferred solution *a priori*. This has been the halakhah (the religious law) since the Middle Ages.

However, in Talmudic times (3rd to 7th century CE), there had been a discussion whether the circumcision of a gentile was valid (*'Abod. Zar*. 27a), with two opinions based on the creative interpretations of two different verses. Further, the question was also raised whether a circumcised gentile (e.g., an Arab) or an uncircumcised Israelite (e.g., a likely hemophiliac) could perform a valid circumcision. Only later would rabbinic authorities, quoted above, choose the most lenient opinion. Yet, in Talmudic times the most popular opinion seemingly held that the agent of a circumcision must have also undergone a valid (Jewish) circumcision. For instance, it was argued that Jewish women could perform a circumcision only "because they are [considered as if

[17] Malley, Barrett 2003, 6.

[18] Maimonides, *Mishneh Torah*, Hilkhot Milla 2.1; my translation in Biró 2013a, 136.

naturally] circumcised." The biblical reference to Zipporah operating Moses' son (Exod 4:25) was not sufficiently convincing, and rather explained away (*'Abod. Zar*. 27a.).

Only gradually did this intuitive view, fitting universal cognitive schemes (according to which a circumcision is valid if performed by an enabled agent) gave way to the "theologically correct" view (i.e., a circumcision is valid if performed in order to fulfill God's commandment) – and it only did so in learned circles. The intuitive view could survive elsewhere, in spheres less influenced by or consciously rejecting deliberate theological thinking: among the unlearned (as attested by Malley and Barrett), among the heretics ("splinter groups"), and in non-legal, rather poetic, "imagistic" genres (such as liturgical poems and aggadic midrashim).[19]

Logic dictates that the prior circumcision must also have been performed by a person who had been circumcised… and the recursive chain goes back in time. Otherwise, the current circumcision would not be valid. The intuition of the lay believer (yet to be confirmed experimentally) is possibly that the agent of a circumcision is entitled to perform the ritual, *because* he (sic!) was also circumcised by a person who was also circumcised by a person who was also circumcised by… a person who was circumcised by Abraham.[20]

Here enters the original question: who circumcised Abraham? If it was God, the circumcision is a *special-agent ritual* in the theory of Lawson and McCauley,[21] that is, an action with the culturally postulated superhuman agent present somewhere in the structural description of the agent slot of the action (even if via an indefinite chain of prior rituals). If, however, it was not God, then the superhuman agent needs to enter the ritual in some other ways.

This is the point to turn to the reason slot and goal slot of the ritual.[22] In the halakhically-minded approach of rabbinic Judaism, the ritual has a *reason*: it is a commandment (mitzvah) of God. It appears not

[19] A rather late example is a medieval poem sung by German Jews even in recent times following a circumcision meal that includes the sentence, "A woman may circumcise but a gentile may not, *for only the circumcised may circumcise*" (Silverman 2006, 132, referring to the discussion mentioned above in *'Abod. Zar*. 27a; emphasis is mine).

[20] Observe that Joshua is the agent of the circumcisions in Josh 5:2-8. While a simple explanation is that the leader of the people, the protagonist of the book is assigned the task, our cognitive analysis provides a further interpretation. It is safe to assume that the intuitive idea of a chain of circumcisions goes back as early as the tradition on which Gen 17 is based, and so it must have already been present when Joshua was edited. Consequently, the editors of Joshua might have felt a need to emphasize the continuity of the chain, and therefore they presented Joshua, presumably born and circumcised in Egypt, as the one who *personally* performed the ritual.

[21] Lawson, McCauley 1990; McCauley, Lawson 2002.

[22] The goal mentioned here should not be confused with *goal* as a thematic role in linguistics (*viz*. the direction or endpoint of a movement, such as *Paris* in *John travelled to Paris*). In fact, I am currently hesitant whether to include the explanation of a ritual simply as a slot, similarly

only in Gen 17:12-13 ("…he that is eight days old shall be circumcised among you, every male *throughout your generations*…" – emphasis is mine), but also in Lev 12:3 ("and in the eighth day the flesh of his foreskin shall be circumcised"). The later verse uproots the act from the Abrahamic narrative tradition, and plants it into the ahistoric ritual system of the Priestly Code, and later, into the legal system of rabbinic Judaism.

And yet, the original tradition is not forgotten. The Priestly Code recounts the story in Gen 17, and rabbinic Jewish communities have maintained for two millennia the perception of circumcision as *the* way for entering Abraham's covenant. In other words, the ritual also has a *goal*: changing the social status of the baby boy (and of the male convert, for that matter). Circumcision is understood as a rite-of-passage by many, "as the infant's passage from a state of 'nature' to one of Jewish 'culture.'"[23] In fact, I remember a urologist overseeing circumcisions in Israel telling me once: "I have made two Jews today", that is, he had just performed two circumcisions turning babies into Jews.

Note the consistency problem with this approach, since baby girls and female converts, as well as male hemophiliacs are not circumcised and can nevertheless "become Jews." Indeed, in the legal system of halakhic Judaism, a person becomes Jewish by being born to a Jewish mother, or by immersing in the ritual bath as the last step of the conversion process. Under certain conditions – that is, if the patient is a healthy male – circumcision is a commandment accompanying the event (succeeding birth, preceding conversion) leading to a new Jew, but not a *sine qua non*. That is the theologically correct ("halakhically correct") representation of the concept.

In contrast, we also have the intuitive representation, which is locally optimal, even if globally not. Inserting a *goal* in this representation by connecting the ritual to the Abrahamic narrative, the representation becomes "stronger", even if it introduces inconsistencies with more distant representations.

IV. Why It Matters Who Circumcised Abraham

After describing the structure of the Jewish circumcision ritual, we return to our original problem. As mentioned in the introduction, the verb referring to circumcision in Gen 17 appears in a passive stem

to its agent, patient, location etc. From a network perspective, however, it is clear that strong links connect the ritual to other statements in the religious system.

[23] Marcus 2004, 45.

(*niphal*), leaving the agent of the circumcision (the logical or semantic subject) unspecified:

> Abraham was 99 years old when *he was circumcised* in the flesh of his foreskin, and his son Ishmael was 13 years old when he was circumcised in the flesh of his foreskin. Thus Abraham, together with his son Ishmael, *was circumcised* on that very day.[24]

Who performed the ritual when Abraham "was circumcised"? One might speculate that in an earlier version of the text, God himself cut Abraham's foreskin. While Gen 17 is usually considered to originate from the hand of P,[25] the subsequent chapter 18, belonging to the J source, depicts Abraham's personal encounter with Yahweh – at least, if read in its ancient near eastern context and ignoring later monotheistic exegetical traditions.[26] Therefore, I dare to conjecture that P employed an earlier tradition in which the deity personally circumscribed Abraham, but then P or a redactor blurred that detail as an early step in the gradual deantropomorphization of the God concept.

If the culturally postulated counterintuitive agent were actively involved in the initial circumcision ritual, which instituted the covenant, then all subsequent circumcisions in the chain of rituals could be viewed as special-agent rituals, contributing to a balanced ritual system.[27] Namely, with the definition of Lawson and McCauley in mind, one would seek and find the deity indirectly associated to the agent slot of those Jewish rituals. The reason is that they are mentally construed – as we have seen, this is an intuitive, but theologically incorrect construction – as a ritual that has an agent (the *mohel*) who has undergone a circumcision that has an agent who had undergone a circumcision … [here comes a chain of indefinite length] … who had undergone a circumcision that has Abraham as its agent who [and here comes the main point] had undergone a circumcision performed by God himself. Alternatively, a circumcision in Judaism can be argued to be 'special-agent-like' because it is strongly associated with (mentally construed as a reenactment of) the circumcision of Abraham, which in turn would be a special-agent ritual.

Unfortunately, the canonized text of Gen 17 does not allow for such an interpretation. Therefore, it is questionable if circumcision functions as a true special-agent *rite de passage* in the ritual system of rabbinic Judaism. In general, it has been argued that Judaism lacks special-agent rituals, which fact leads to the "tedium effect" and opens the floor to

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[24] Gen 17:24-27; translation Speiser 1964, 123; emphases are mine.

[25] Speiser 1964, 126.

[26] Speiser 1964, 131. Note also verse 17:22, which similarly presupposes a personal encounter between Abraham and God.

[27] McCauley, Lawson 2002.

"imagistic splinter group movements" with new special-agent rituals.[28] For instance, Risto Uro has analyzed baptism by John and in early Christianity as a "reshaping of Jewish purification with water into a rite in which a ritual agent (baptizer) acts for a ritual patient (baptizand)" (i.e., it is remolded as a special-agent ritual).[29]

Various movements within Judaism have also introduced new rituals, and so they can be analyzed along the same logic. The *tish* of the Hasidim is a prime example: the rebe or tzadik, the charismatic leader of the Hasidic group, a proxy for the divine, acts as the agent of this ritual, when he distributes the residues of his meal among his followers, the recipients of the ritual. According to Sagiv, "Hasidim often describe their rituals such as the sacramental meal at the court of the tzaddik (…) as the most representative and significant phenomena of their Hasidic experience, more so than the impact of specific Hasidic doctrines."[30] As predicted by McCauley and Lawson, the special-agent ritual newly introduced by the charismatic movement counteracts the tedium effect characterizing the original, unbalanced ritual system (which the authors equate with Whitehouse's doctrinal mode).

Another example could be the changing role of the community rabbi, who has been considered more and more by non-orthodox communities as a "priest" empowered to perform rites of passage (circumcisions, bar mitzvas, weddings and funerals) on behalf of God. The lay Jewish informants of the Malley and Barrett study might have had comparable intuitions regarding the *mohel*. Yet, further studies are necessary to establish firmly such a trend in contemporary (non-orthodox lay) religiosity.

Beside the introduction of new rituals, I conclude, the renewal and reanalysis of existing ones is also a strategy to revitalize a ritual system from the tedium effect.[31] In what follows, I propose that some midrashim advanced new readings of Gen 17 with the (unconscious) goal of strengthening the divine agency in Abraham's circumcision. Indirectly, these ideas also affected the contemporaneous ritual re-enactments of Gen 17,[32] and consequently turned the whole ritual system into a more balanced one.

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[28] Biró 2013a; 2013b. For the "tedium effect" in ritual systems and the emergence of "imagistic splinter groups," refer to McCauley, Lawson 2002;Whitehouse 1995; 2004.

[29] Uro 2016, 164.

[30] Sagiv 2019, 21-22.

[31] Cf., among others, Sagiv 2019.

[32] Arguably, the midrashim represent an age (the latter Talmudic period and subsequent centuries) and a genre (literary, non-legal) in which the intuitive view of the circumcision still overshadowed the halakhically correct approach. Therefore, a new reading of Gen 17 would appear in the structural description of any contemporaneous circumcision: *viz.*, the circumciser of the circumciser of the circumciser … of the current circumciser was Abraham's circumciser.

V. Who performed Abraham's Circumcision? Various Answers

A midrash is a genre of biblical exegesis in late antique rabbinic Judaism that is relatively difficult to define. I view the *drash* technique as an intellectual somersault:[33] given is a biblical verse with some textual difficulty or ambiguity, which serves as a springboard, and a creative reading thereof brings the reader to a new dimension of interpretations. In what follows, I present some sources that employ the passive voice (the *niphal* form) in Gen 17 as their springboard.

The standard Jewish interpretation of verse 24 is that Abraham circumcised himself.[34] In the early *Genesis Rabbah* (49.2), he circumcises himself, but receives extra divine help:

> Then Abraham said to Him; "And who shall circumcise me?" "Thyself," He replied. Abraham took a knife forth with and held his foreskin and was about to cut it, yet he was afraid, being an old man. What did the Lord do? He put forth His hand and held it with him, whilst Abraham cut.[35]

This view has become the standard interpretation in rabbinic Judaism[36] and beyond.[37] Yet, in the late midrash *Tanhuma Yelammedenu* (Warsaw ed., Lech lecha 17), the story is retold differently. No agent acts, but Abraham suddenly realizes with the help of a scorpion that he has been (he has become) circumcised:

> Rabbi Ishmael stated: [...] Abraham sat and wondered how he was to be circumcised, after the Holy One, blessed be He, informed him: "I will establish my covenant between Me and thee" (Gen. 17:2). What follows this verse? "And Abraham fell on his face" (ibid., v. 3). Once he fell on his face, the Holy One, blessed be He, indicated that place, and a scorpion bit him there. Forthwith, Abraham found himself circumcised.[38]

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[33] The *drash* is the exegetical technique, which results in a *midrash*, many of which are most often collected in *midrash collections* (also referred to as *midrashim*). Yet, *midrashic* interpretations may also appear in other rabbinic sources, such as the two Talmudim. Finally, to add to the confusion, the term *midrash* may also refer to the process of (creative and/or late antique) rabbinic bible exegesis in general. In the present article, the first usage of the term is intended.

[34] E.g., *Gen. Rab.* (Vilna ed.) *Vayeira* 48.4-5. Observe that even the learned authors of the *Encyclopaedia Judaica* automatically reiterate the biblical story as Abraham performing circumcision on himself at the age of 99 (Sarna *et al.* 2007; Seidel *et al.* 2007). Refer also to the parenthetical remark in the passage from Malley, Barrett 2003, 6, cited above.

[35] Translation Freedman, Simon 1939, 420, n. 1.

[36] See also Tanhuma Yelammedenu (Warsaw ed.) *Vayera* 2.5: "R. Aha said: I will prove to you that the Holy One, blessed be He, strengthened Abraham. On the very day he circumcised himself, and while his blood was still flowing, he circumcised Ishmael and all the men of his household" (translation Berman 1996, 114).

[37] According to Ambrose of Milan (AD 397), "Abraham is ordered to circumcise himself when he is about to receive the inheritance of a true progeny" (https://catenabible.com/gn/17/11).

[38] Translation Berman 1996, 104.

Pirqe de-Rabbi Eliezer (henceforth, *PRE*), an anonymous aggadic work composed probably in the eighth century in the Land of Israel, proposes a different interpretation:

> Abraham sent and called for Shem, the son of Noah, and he circumcised the flesh of the foreskin of our father Abraham, and the flesh of the foreskin of Ishmael his son, as it is said, "In the selfsame day was Abraham circumcised, and Ishmael his son" (Gen 17:26) (…) Know then that on the Day of Atonement Abraham our father was circumcised.[39]

According to this work, Abraham was circumcised on the Day of Atonement by Shem, the son of Noah. The timing of the story to a date that will be sacred in the generations to come is certainly significant, as it reinforces the connection in the religious network between the biblical narrative and the Jewish holiday.[40]

The choice of Shem is another noteworthy detail in this passage. *PRE* might be aware of the rabbinic tradition claiming that Shem was born circumcised.[41] If so, then Abraham is presented here as being circumcised by a circumcised person. Obviously, this solution raises a further question: who circumcised Shem? The answer is similar to the previous passage from *Tanhuma Yelammedenu*: no human agency, but a natural force or a miracle is responsible – that is, if you wish, God himself "personally" performed the circumcision. By induction, all circumcisions are ultimately turned into a special-agent ritual.

An earlier passage in *PRE* (Chapter 8) presents Noah and Shem as firstborn-priests. (According to the biblical account, the firstborns were originally priests, but they would later pass on that function to the Levites, cf. Num 3:45). This observation allows for yet another interpretation: it was not a prior enabling ritual, but a special status acquired by birth that enabled Shem to perform this ritual. Importantly, *PRE*, similarly to earlier rabbinic traditions, identifies Shem with Melchizedek, presented explicitly as a priest in Gen 14, another reason to endow him with the power to perform a ritual.[42] PRE does not make this connection explicit, but we shall soon see that Melchizedek had already been identified as the circumciser of Abraham five centuries earlier.

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[39] *PRE* 29, translation Friedlander 1916, 203-204.

[40] It is the concept of the (sacrificial, ritual) blood that connects Gen 17 to Yom Kippur. Note that another episode of Abraham's life, the *Aqeda* (the binding or sacrifice of Isaac in Gen 22) is associated to Rosh Hashanah, ten days before the Day of Atonement. *PRE* is in opposition with the tradition of the Babylonian Talmud (*B. Meṣi'a* 86b), according to which the circumcision of Abraham took place on Passover (Friedlander 1916, 204, n. 2).

[41] Friedlander 1916, 203, n. 3.

[42] *PRE* 8 presents Shem = Melchizedek as a priest, a forerunner of the kohanim in Jerusalem. See also Friedlander 1916, 53, n. 7; 195, n. 9.

Midrash and Aggadah open the door to creativity and "intellectual poetry." Unlike down-to-earth halakhah (religious law) with its intellectual rigor, midrash and Aggadah come with poetic license. Alternative accounts of Abraham's circumcision do not exclude each other, as long as the authorities in the interpretative community and its borders are not questioned. Within the limits, all interpretations are permitted that strengthen the network of religious concepts, values, texts, precepts, and institutions.

Now, let us turn to a true splinter group, which certainly questioned those authorities and borders. Anan ben David was an ascetic Jewish sage and heretic in the mid-eighth century Babylonia (the early phase of the Islamic period). Not much is known about him. According to various medieval traditions, he was refused being appointed exilarch of the Jewish community in Iraq, and so he founded the sect of the Ananites. This group would merge with the early Karaites, and therefore, a few centuries later, he would be regarded, and still known today, as the founder of the Karaite movement.[43] His major work, *Sefer ha-Mitzvot* ("Book of Precepts"), which only survived in fragments, states:

> A man must be circumcised by another man and may not circumcise himself with his own hand, since Scripture says: "And ye shall be circumcised in the flesh of your foreskin" (Gen 17:11). Were the meaning to be that a man may circumcise himself with his own hand, it would have been written, "And ye shall circumcise the flesh of your foreskin"; the wording "And ye shall be circumcised" indicates therefore that someone else must circumcise him.[44]

Anan ben David, and later the Karaite movement, rejected the so-called Oral Law, or Oral Tradition, claimed by the rabbanites to originate at Mount Sinai, and taking shape in the form of Rabbinic literature: the Mishnah, the Talmudim, the midrashim, and so forth. By rejecting the dogma of the rabbis' Oral Law originating at Mount Sinai, Anan ben David questioned rabbinic authority – including political, exegetical and halakhic authority. Here we can observe how he rejected the standard rabbinic understanding of Gen 17, according to which Abraham circumcised himself, as well as the ensuing legal rulings on self-circumcision.[45] Anan rather hinted that Abraham and Ishmael circumcised each other,[46] and simultaneously he altered the halakhah by prohibiting self-circumcision.

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[43] Nemoy 2007; Polliack 2002.

[44] Nemoy 1952, 20. Cf. Harkavy's edition, p. 78.

[45] According to the *Mekhilta* (*Pisha* 18, ed. Lauterbach, 111-112), an early halakhic midrash collection on Exodus, a male person is obliged to circumcise himself, should his father not have performed this precept. This theoretical formulation, challenged by Anan, is translated into practice as the person being required to have himself circumcised upon reaching adulthood.

[46] According to Anan Ben David, proselytes circumcise each other (Harkavy's edition, 79).

Notice that Anan would not turn circumcision hereby into a special-agent ritual. Still, I propose, he intuitively (unconsciously) understood that Abraham's self-circumcision should be reinterpreted in order to achieve a more balanced ritual system for his splinter group movement, a better alternative to the rabbinic ritual system. He failed to do so, and indeed, his *Sefer ha-Mitzvot* would not become the basis of an established sectarian halakhic code among his followers in the centuries to come.[47] In this respect, the case of Anan Ben David teaches us that not all splinter group leaders intuitively manage successfully to remedy the tedium emerging in unbalanced ritual systems.

Also observe how this heretic constructs a full religious system: a network of biblical interpretations, of halakhic rulings and of rituals. His book is meant to replace the standard corpus of rabbinical halakhah (primarily, the Mishnah, the two Talmudim and the halakhic midrash collections), while the biblical basis and the methodological framework was hardly transformed. Hereby, Anan's was a preliminary attempt to create a "counter-rabbinical Judaism" and studying it sheds more light on how Anan and his contemporaries mentally constructed Judaism.

Finally, let us mention a patristic source that came up with another solution. Hippolytus of Rome, an early third-century church father, in a fragment of a lost commentary on Genesis, claims that the one who circumcised Abraham was Melchizedek, the king of Salem (Gen 14:18).[48] Even if earlier Christian authors, such as Justin Martyr and Tertullian, had emphasized that Melchizedek was uncircumcised, Hippolytus' suggestion fits our scheme. Namely, Melchizedek is said to be the "priest of El-Elyon" (Gen 14:18), a deity unquestionably identified with God by all monotheistic post-biblical readers. Hence, Melchizedek, established as the proxy of the divine in Gen 14, would act on God's behalf in Gen 17. Surprisingly, rabbinical Judaism – to my best knowledge – has never espoused this interpretation, which would definitely establish circumcision as a special-agent ritual. Yet, as we saw, *Pirqe de-Rabbi Eliezer* made it very close.[49]

To summarize, an extremely large number of answers can be given to the question posed in the title of this article. Eyeballing just a sample of the interpretive traditions on Gen 17, we could collect at least the following answers: nobody, a natural force or a miracle, God (e.g., via miracles), Abraham himself, Ishmael, Shem, and Melchizedek. These

[47] Marzena Zawanowska, personal communication (2012). See also Polliack 2002, 304.

[48] Pearson 2002, 187.

[49] In rabbinical Judaism, *PRE* has been a known and widely cited, and yet, somehow peripheric text. Refer to McDowell 2021 on the "strangeness" of this composition, which cites, or is conversant with, a surprisingly broad spectrum of literary traditions (from Second Temple literature to Christian apocrypha, Qur'anic exegesis and Gnostic sources).

answers, these interpretations of a biblical narrative interact with a broader network of mental representations.

Another mental representation in this network is circumcision as a practiced ritual. The conceptualization of this ritual involves question such as what makes the ritual valid. Here, again, a number of answers can be given, including: the ritual is valid if performed by a superhuman agent, or if performed by an agent enabled by a prior ritual, or if performed by a priest (whatever makes someone a priest), or if performed for the sake of fulfilling God's will.

Since the two mental representations interact within the network, the answers given to these two questions will also interfere with each other. For instance, in a hypothetical pre-P tradition the divine could himself circumcise Abraham. A miraculous divine intervention plays a similar role in a monotheistic culture with a more abstract God concept. Melchizedek was proposed by a Christian author, arriving from a religious tradition with a strong priesthood. Finally, self-circumcision is the appropriate answer in a culture (that of the rabbinic elite) which emphasizes the scholarly intellect to understand, and the conscious intention to fulfill God's will. Abraham being the intellectually (theologically, philosophically) most advanced person of his generation, he must be the best candidate to perform the ritual.

In the rest of the article, I will sketch a network model to understand the procedure of how to find the best candidate.

VI. A Different Network for Genesis 17 and Abraham's Circumcision

When readers are exposed to a text, their mind must solve several complex cognitive tasks, including morphological and syntactic parsing, syntactic and word-sense disambiguation, and so forth. A notorious problem in contemporary theoretical and computational syntax is *anaphora resolution*,[50] a simpler version of the problem facing the exegete in Gen 17:24.

Compare, for example, the Hebrew text of 1 Chr 15:1 and Neh 13:5. Both sentences begin with the phrase *wa-yaas lo* ("and he made him"). Yet, in the former verse *lo* "to him" refers to the subject of the sentence (to David, and it should be translated to English as *to himself*), whereas in the latter verse it refers to the dative object of the previous sentence (to Tobiah). How does the human mind or a piece of language technology software determine which entity in the discourse a pronoun refers

[50] For recent examples from Biblical Hebrew syntax, cf. Miller-Naudé, Naudé 2019; Holmstedt 2019.

to? This question, known as anaphora resolution, has been a hot topic in generative syntax since the 1980s, and in computational linguistics in the past two decades.[51]

Our current problem is similar: the passive form "was circumcised" in Gen 17 conceals the agent (logical or semantic subject) of the action – as if there were a phrase "by X", and X were the anaphora to resolve. Can we uncover the hidden agent of the action? Similarly to anaphora resolution, we would first check the entities prominently present in the discourse. In computational linguistics, the simplest solution is to look for the most recent noun phrase that agrees in gender and number with the pronoun to be resolved. In Gen 17, we should test the protagonists of the episode. There are two: God and Abraham. There might be a cognitive bias toward simple actions (an agent acting upon a patient), whereas reflexive actions (an agent acting upon themselves) are rarer, and they are usually expressed with more complex linguistic means. It follows that the first interpretation of Gen 17 would be God circumcising Abraham. And yet, if the cognitive mechanism (such as an elaborate theological system) outlaws an anthropomorphic interpretation, then the second best solution will be Abraham circumcising himself. Thus, we arrive at the standard rabbinic interpretation of Gen 17.

Further solutions are also imaginable. For instance, agents that are not present in the current episode, but were already introduced at an earlier stage to the narrative, could also be solutions. Such are Melchizedek, Shem, Sarah, Ishmael, and Eliezer of Damascus; or a few of them together. As we have seen, Hippolytus of Rome chose Melchizedek, the anonymous author of *PRE* took Shem, and Anan Ben David preferred Ishmael. Why these three, and why not Sarah or Eliezer? It could be just coincidence, or further cognitive factors may also be at play. Ishmael is the third character appearing on stage in Gen 17, which might make him more prominent. With regard to Melchizedek, being a "priest of El-Elyon" makes him a natural candidate as the performer of a religious ritual (conceived otherwise in surrounding cultures as a rite of passage).

Yet another solution would be to introduce a new, so far unknown character: an unnamed servant, an animal (for example, a scorpion), or a natural force (by way of a miracle). In fact, it is also possible to interpret the *niphal* form not as a passive, but as a middle voice: circumcision happens as a natural phenomenon, without any agency.[52] Thus we arrive at the interpretation proposed by *Tanhuma Yelammedenu* (turning

[51] For a linguistic example of anaphora resolution with a technique similar to the one described in the latter part of this article (and described with more technical details), refer to Biró 2009.

[52] Waltke, O'Connor 1990, 381. Compare, for instance "Then God *split open* (b.q.ˢ., *qal*) the hollow" (Judg 15:19) to "And all the springs of the great abyss *burst open* (b.q.ˢ., *niphal*)" (Gen 7:11).

circumcised), as well as to the circumcision of Shem in *PRE* (being born circumcised).

Still, the question arises why different exegetes arrived at different solutions. The cognitive mechanism I have argued for elsewhere,[53] originating in linguistics,[54] posits that the mind searches for the optimal solution among a set of candidates. Yet, the set of candidates is not necessarily an explicit list: in fact, it might be an infinite list, which the mind could not handle. Not all candidates are generated by the mind. The mind creates a first option, and subsequently compares it to a slightly different alternative option. If the alternative option is better (or not significantly worse), then the mind switches to this alternative. This procedure is repeated many times, until no more slightly different, better options can be found.[55]

Put it differently, the candidates originate in the large network of mental representations but restricting it to agent-like entities related (directly or indirectly) to Gen 17. These candidate mental representations are organized into a new network (unrelated to the one I have discussed above), for instance, based on similarity: similar mental representations will be neighbors. Another option would be to employ a free association network: if you have X in mind, whom or what would you think of next? If the mind is able to switch from candidate *x* to candidate *y*, then *x* and *y* are linked in the network.

The algorithm performs a "random walk" on this network. Imagine a robot that is initially put on a random node. Subsequently, each time I clap, it runs the following program: (1) it chooses a random neighbor (another node that is connected to its current position by an edge), (2) it compares its current position to its neighbor, (3) it decides whether to move there.

Without entering technical details, (2) implies some "goodness" function (called a target function or a harmony function or cost function to be optimized). This function provides the dimension along which possibilities are compared. For instance, is it better to suppose that Abraham was the agent of the ritual, or would it be better to suppose it was Hagar? The comparison should include many, hardly comparable factors: which solution fits better the linguistic details of the text (e.g., gender and number agreement), the axioms imposed by our cognitive system (e.g., only agents can initiate actions), our knowledge of the contemporaneous world, and our theological preferences, among others.

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[53] Cf. Biró 2006; 2009 and references therein.

[54] Prince, Smolensky 1993; Smolensky, Legendre 2006.

[55] The algorithm is called *simulated annealing*. The probability of switching to the alternative option depends on how much the "goodness" (harmony, optimality) of the candidate would change, as well as on a parameter called "temperature". For the mathematical details and their connections to statistical physics, refer to Biró 2006.

Regarding (3), the general idea is that the robot will probably move to a better neighbor, but it will probably not move to a worse candidate. These probabilities might change during the computation, but when the algorithm terminates, the robot will not be able to move to worse neighbors anymore. Consequently, by the end of the random walk, the algorithm will settle down somewhere. This candidate is a *local optimum*: a vertex of the network that is a better solution to the problem than all of its neighbors. Importantly, it is not the *global optimum*: other candidates might be even better than this solution found by the algorithm.

Imagine climbing a hill in thick fog in order to find the highest point of the landscape. Which each step, you move uphill until you do reach the top… of some hill, which is not necessarily the highest hill in the region. Depending on where you leave from and which directions you take, you might end up on the top of different hills. Similarly, it is conceivable that different readers will come up with different interpretations. The horizontal dimensions of the landscape correspond to the network of candidates, to which a vertical dimension is added: how they satisfy the various requirements, constraints and restrictions mentioned earlier. Thus emerges a complex landscape in which the mind of the reader seeks *the globally best* solution, but might only arrive at *some locally best* answer. Different people arrive at different answers.

To render the picture even more complex, we should not forget that different exegetes might wish to insert their reading of the text into divergent religious systems. A rabbinic Jew, or Anan Ben David rejecting the rabbinic authority, or a church father will run this optimization process in dissimilar landscapes, since their respective solutions must fit into divergent religious systems, that is, their solutions must satisfy divergent constraints.

VII. Conclusion

Network theory can shed light on religious phenomena – within and beyond monotheistic religions, including, but not restricted to rituals – in various ways.[56] This article has outlined a framework in which a network of mental representations (concepts, precepts, narratives, rituals, and so forth), with dense links interconnecting these vertices, influence further religious phenomena. The main part of the article presented a tentative description of a mechanism that drives biblical interpretations.

Given is the ritual of circumcision in rabbinic Judaism, with all its connections to biblical texts, social facts, ritual objects, beliefs, sacred

[56] For a recent, although somehow unrelated example, showing how social networks in a Jewish community can shed new light on the analysis of ritual immersion, see Karpati 2021.

times and places, religious institutions, but also to further rituals. To be more precise, we are concerned here with a system – that is, a network of mental representations thereof. Instead of conflating ontologically very different categories – ranging from physical entities to culturally postulated and construed abstract concepts – we focus on a more homogeneous set of "mental data structures" residing in the brain of the member of the community. The aim of the cognitive enterprise is to understand how social and cultural (including religious) phenomena emerge as the product of the human mind. Therefore, a cognitive model is an attempt to reproduce observations as the outcomes of mental "computations" on these "data structures". For instance, the various interpretations of Gen 17 should emerge as cognitively preferred, special states (locally optimal states, or equilibria) of this network.

In particular, the system imposes a strong, culturally introduced requirement to avoid anthropomorphisms. At the same time, general (universal) cognitive constraints are also active: an action must have an agent (an ontological agent filling the agent thematic role), and a ritual system always seeks a balanced state. All these factors are present in the human mind, when it is presented with a task, such as the interpretation of a text, for instance, the agent-less passive form in Gen 17:24. In the final part of the article, I argued that the mind employs a local optimization algorithm, which is, however, not guaranteed to find *the* single best optimal solution. Therefore, several outcomes can be produced – and have, indeed, been produced, as attested by the history of biblical exegesis.

The cognitive sciences – cognitive theories of rituals, basing themselves on advances in generative linguistics and cognitive psychology – provide new research questions in biblical exegesis, an example being the focus of the present article on the role of agency. Network models provide novel types of answers when they explain why the biblical text could be interpreted in so many ways.

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