

The Cultural and Cognitive Scaffolding of Global Exchanges

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Abstract:

As trade expanded beyond local contexts, uncertainty in social and economic interactions presented significant challenges. Drawing from cognitive science and cultural evolution, I introduce the cultural-cognitive scaffolding hypothesis, highlighting how cultural practices transformed uncertainty into manageable risks. These scaffolds—ranging from branding and record-keeping to the use of kinship and group affiliations—leveraged existing cognitive processes, such as theory of mind and norm psychology, to transform uncertainty into risk. The hypothesis also emphasizes the dynamic nature of these practices, showing how they co-evolved with trade systems and institutional frameworks, often becoming fossilized features of economic exchanges. This paper synthesizes a broad literature to present a unified framework for understanding the interplay between cognition, culture, and the development of exchange networks. It highlights the importance of cultural practices in shaping perceptions of risk and trust, arguing that these practices played a crucial role in the historical scaling of trade networks. This approach bridges gaps between disciplines and provides insights into modern economic systems, emphasizing the enduring impact of cultural and cognitive adaptations in managing uncertainty and fostering global exchanges.

1. Introduction: The Difficult Path to Globalized Exchanges

Our contemporary world is one of exchanges of all scales, from the one-to-one to global networks, all across our planet. This world emerged through the development of large exchange networks that crossed physical, political, cultural, and social boundaries (Seabright 2010). Along with goods, these exchange networks carried cultural and social practices and ideas (Kristiansen *et al.* 2018; Pomeranz & Topik 2017; Sabloff & Lamberg-Karlovsky 1975), including military technologies (Turchin *et al.* 2021) and world religions (Foltz 2010; Michalopoulos *et al.* 2018). Over the last few thousand years, exchanges, and especially commercial trade, have increasingly occurred beyond local contexts, growing more and more impersonal. The history of trade is one of successive, local expansions and occasional contractions, ultimately leading to large-scale commercial exchanges becoming a defining feature of contemporary society (e.g., W. J. Bernstein 2009; Pomeranz *et al.* 2017; Cameron *et al.* 1993).

Expanding exchanges over increasing physical and cultural distance has led to highly uncertain situations. Some of this uncertainty can be attributed to straightforward risks, such as a ship sinking or a caravan being attacked, but a significant part of it relates to the decisions of one's exchange partner. For example, individual incentives may favor defection or cheating when exchanges are subjected to the principal-agent problem (Ross 1973; Stiglitz 1989), lack a known temporal horizon (Bradley *et al.* 2018; Clark & Sefton 2001; Cochard *et al.* 2004), or have a short temporal horizon (as exemplified by the well-known "end game effect"; e.g., Axelrod 1980; Bar-El & Tobol 2013; Schuessler 1989). Certain types of information distribution can make an exchange uncertain, either due to lack of information about the goods exchanged (informational asymmetry; see Akerlof 1978) or about the exchange partners themselves (e.g., anonymity; see Bradley *et al.* 2018).

While these characteristics are less frequently encountered locally, local contexts are also supposedly the environment in which cognitive and cultural adaptations to social exchanges developed and for which they are helpful. Specific cognitive adaptations included the ability to detect cheaters, as it is easier for humans to detect who isn't following a social rule than to solve an analog logical problem (Cosmides 1989; Cosmides *et al.* 2010; Cosmides & Tooby 2015; Gigerenzer & Hug 1992; Sugiyama *et al.* 2002), as well as the range of cognitive processes related to our social life that might be at play in exchange situations. These include the ability to track and infer others' mental states (mind-reading or theory of mind (Apperly 2012; Carlson *et al.* 2013) and preferences (for instance, through naïve utility calculus, Jara-Ettinger *et al.* 2016, 2020), as well as a remarkable and early understanding of giving and taking (Tatone *et al.* 2015).

As exchanges covered greater spatial distances over the last 5,000 years, with growing and more diverse networks of participating actors and a greater diversity of exchanged goods, the nature of interpersonal contacts upon which the exchange networks were built changed. Exchanges might have started as nested within the scope of established social relationships and social norms – even across large distances and populations (Bird *et al.* 2019; Boyd & Richerson 2022; Pisor & Ross 2022). Yet, over time, another type of exchange, one that takes place *outside* of established social relationships, started to emerge and spread alongside small-scale, everyday or occasional

exchanges within a known social world. This meant that while the challenges of exchanges became more difficult, mechanisms that ensured exchanges in relatively local contexts became less efficient or even unavailable. Another difficulty is that institutions, legal systems, and other mechanisms often identified as solutions to such challenges (North 1990, 2010) would not have been available or only in much less developed forms. In other words, exchange beyond local contexts happened in conditions of relative institutional deficiency.

Given the great uncertainty hindering the expansion of exchanges, how did they manage to do so? All these different characteristics of exchanging outside known social relationships and over larger physical and cultural distances created a situation of high uncertainty, especially about the behavior of potential exchange partners. Understanding how exchanges were able to expand, eventually to the global level, requires us to answer the following question: How was uncertainty about exchange partners' behavior managed? While cognitive scientists have explored decision-making under uncertainty (FeldmanHall & Shenhav 2019; Gigerenzer & Gaissmaier 2011; Johnson & Busemeyer 2010; Mousavi & Gigerenzer 2017; Tversky & Kahneman 1974), it has primarily been studied in contemporary (and WEIRD) contexts and rarely has been considered a significant force in historical phenomena.

Notably, uncertainty is not the same as risk (Volz & Gigerenzer 2012). The original distinction between uncertainty and risks in economics (Knight 1921) states that risk refers to situations in which the likelihood of different outcomes can be estimated mathematically (in its original definition, *risks* refer to a situation of perfect knowledge). In contrast, uncertainty cannot be expressed or associated with any quantity (neither frequencies nor probabilities). Risky or uncertain situations usually involve two types of information: (1) the expected benefit and (2) the probability of getting the expected benefit. Situations of complete uncertainty include no information about either, and situations of pure risks provide information on both, while many real-life situations might fall between these two cases (see Figure 1). Because of this essential difference, uncertainty and risk call onto different cognitive pathways: Bayesian updating works for risks (as long as it is computationally tractable) but not for uncertain situations – which, it has been argued, typically require decision-making to use *heuristics* (Gigerenzer & Gaissmaier 2011).

Here, the problem of expanding exchanges beyond local contexts depends on successfully explaining why traders were willing to invest in highly risky and uncertain ventures that could benefit them quite later, thus demonstrating a long-term orientation. Understanding the expansion of exchanges ultimately means understanding how humans managed uncertainty by turning it into manageable risks, building trust, or managing to exchange without trusting their exchange partners.

In this paper, I aim to explain *how* humans were able to start exchanging beyond local contexts (which provided many cues and conditions that make exchanges, if not easy, at least possible) through highly uncertain and institutionally deficient situations to large networks, often secured through institutions. I will identify expanding exchange networks as a cognitive problem centered on managing social uncertainty and explain how it was solved through cultural practices that leveraged specific cognitive mechanisms – what I call cultural cognitive scaffolding. Section 2 of this paper presents the cultural-cognitive scaffolding hypothesis, a flexible framework that aims to articulate and synthesize a large and fragmented literature. Section 3 reviews some cultural practices as a taxonomy, highlighting, in each case, how they have provided cultural cognitive scaffolding to exchange networks. Finally, Section 4 discusses several implications of the cultural cognitive scaffolding hypothesis as an overarching cultural evolutionary account.

2. Cultural-cognitive scaffolding

2.1 The role of cognition and culture in historical dynamics

Cultural cognitive scaffolding occurs when cultural practices alter the cognitive calculus associated with different behaviors, resulting in differences over populational scales. Beyond the domain of trade, cultural practices have influenced the development of cognitive processes (Heyes 2018, 2019; Hutchins 2008).

One substantial way cultural practices and innovations can impact historical dynamics is by altering the cognitive “problem” at hand as much as by solving it. In the case of expanding exchanges beyond local contexts, this means it would have been at least as important to reduce the uncertainty related to perceived risks as to reduce the risks themselves. Here, the idea of cultural cognitive scaffolding diverges from scholarship: Reducing risks becomes an effective strategy for expanding exchange *as long as it is perceived*, rather than on its own. Most approaches to historical and economic dynamics implicitly assume that individuals’ representations are rather well-correlated to the state of the world. If institutions are more efficient, individuals’ incentives change, and their behavior changes accordingly, influencing others’ incentives and behaviors, and so on, in a virtuous cycle. In contrast with the relatively “truthful” way in which agents represent their economic options, the account presented here predicts that perception and representation of the situation – especially of how uncertain and risky it is – might be at least, if not more, important than the actual risks involved: solutions are those that change individuals’ uncertainty and their representations of risks. While the two are obviously related, the difference explains why some cultural practices that only helped to *represent* risks, rather than minimize them, per se, would have contributed to the expansion of exchanges beyond local contexts.

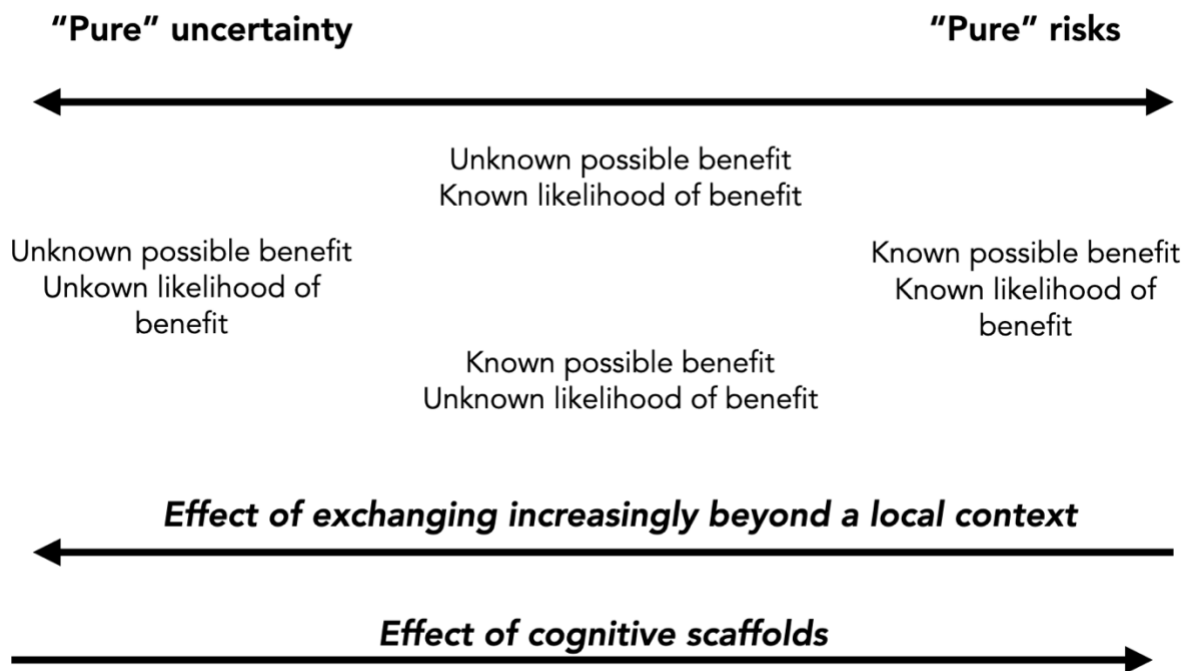


Figure 1. Summary of the cultural cognitive scaffolding hypothesis as applied to exchanges: Situations encountered in real life tend to range from more uncertain (unknown benefit with unknown probability) to risks (known benefit with known probability). Exchanging increasingly further from a local context tends to shift situations away from the risk domain and closer to uncertainty. Cognitive scaffolds have the opposite effect, making uncertain situations closer to situations of risk.

The possible (primarily negative) consequences of discrepancies between individuals' representations and the reality of some exchanges are usually understood in the economic literature in contexts such as informational cascades (Anderson & Holt 1997) or financial bubbles and crises (Ferguson 2008; Quinn & Turner 2020), especially with regards to misrepresenting the value of some goods on a market. The account presented further suggests that this was an important factor in change at historical timescales and explains how cultural practices could have made the uncertainty associated with early exchanges beyond local contexts manageable. Further, this paper argues that to influence representations of how uncertain or risky certain situations were, cultural practices re-used and built on cognitive mechanisms that had already evolved for reasons related to cooperative activities and recreated conditions in which defection would be less likely.

Managing uncertainty can be achieved by one or a combination of: (1) shifting the actual distribution of possible outcomes (in a way that can be perceived/represented by agents, but ultimately because of a change in the "real" likelihoods of different outcomes and what they might be); (2) altering what the problem is (rather than trying to solve a difficult cooperation

problem, such as evaluating who is trustworthy, this might involve identifying whether a signal is reliable and developing a representation of possible outcomes and risks associated with these signals); and (3) representing and bounding possible outcomes (e.g., being able to represent how much could be lost, rather than changing the possible losses themselves).

In the case of expanding exchange networks, some cultural practices have provided effective scaffolds for managing the uncertainty associated with the increasing social risks of exchanging over larger (physical and cultural) distances. These practices are transmitted culturally, acquired through social learning, and depend on distributions of representations (cultural). They actively participate in creating conditions that lead to a different collective outcome—here, exchanges beyond a local community (scaffolding). Finally, they do so through their cognitive effects: influencing representations, decreasing uncertainty, and influencing individuals' decision-making (cognitive). These different actions span the spectrum of what is usually covered within the scope of cognition, from perceiving and understanding to making decisions and acting on them.

Rooted in educational psychology, the concept of scaffolding usually refers to temporary structures that play a role during development and make it possible for a learner to do things they would not have been able to achieve on their own (usually attributed to Vygotsky 1978, see also Shvarts & Bakker 2019). Although human societies do not have a natural development, per se, we loosely apply the analogy to Vygotsky's concept, hypothesizing that these practices allowed exchange networks to expand beyond what they would have been able to achieve without them. Notably, the concept of scaffolding as used in developmental psychology differs from ours in one key respect. In cognitive science, scaffolding plays a purely developmental role: it refers to temporary structures that usually disappear as an individual develops. This is not necessarily the case for the cultural practices considered here: these scaffolds often became a fossilized part of exchanges rather than disappearing as they develop. Their importance fluctuates over time, with some becoming widespread and permanent features of exchanges, and others taking lesser roles and more vestigial forms (see Discussion).

In the view developed here, no perfect strategy exists for expanding exchange networks. Instead, there was and is a diverse set of cultural practices that participated in socially managing uncertainty and that contributed to scaffolding the expansion of trade networks. How much of a role these practices ultimately played depends on two main things: a cultural scaffold's cultural success and how effectively it taps into uncertainty-management mechanisms. Cultural success depends on a cultural practice's evolvability and diffusion. Yet how effectively it manages uncertainty depends on its success at tapping into mechanisms of evaluating possible cooperators and cooperative situations.

One first important prediction of this approach is that cultural cognitive scaffolding will be most important when situations are most uncertain. This means that cases in which coercion was the

primary means of acquiring and circulating goods (e.g., military or colonial expansion) are not concerned with cultural cognitive scaffolding; the outcome is extraction and is not uncertain. On the other hand, cultural cognitive scaffolding might still play a role in goods acquired through coercion once they reach their destination market (e.g., packaging played a role in the adoption of tea in Victorian England (Rappaport 2006)). Cultural cognitive scaffolding will also be more crucial as the quality of goods is hidden or cannot be evaluated ahead of their consumption – e.g., when they are experiential.

2.2 Exploiting cognitive mechanisms by repurposing and evolving cultural practices to assure conditions for exchanging beyond local contexts

Understanding cultural cognitive scaffolds and how they could be effective technologies of uncertainty management requires an understanding of how they evolved and diffused as cultural practices. Which cultural practices can emerge and diffuse depends on factors ranging from local to global, and reflect the cultural practice's fit with specific constraints from the cognitive and communicative processes they involve and their environment (Miton n.d.; Morin 2016; Sperber 1996). Trade networks might have also supported the cultural success and diffusion of the cultural practices they used as cultural cognitive scaffolds, creating positive feedback loops in which some cultural practices contribute to successful exchanges, which in turn also contributes to their cultural success.

Some cultural cognitive scaffolds build on preexisting cultural practices that were not initially used in the context of trade but have been coopted for this use (e.g., kinship, ethnic and religious groups) or on practices that developed and evolved in the context of exchanges (e.g., records, money) yet build on cognitive mechanisms predating the development of exchanges. In addition, cultural cognitive scaffolds typically tap into a suite of cognitive mechanisms that were first and foremost adaptations to other features of human life and got coopted in the context of exchanges. Cognitive-cultural scaffolds rely on cognitive processes, including norm psychology (Gelfand *et al.* 2024; Heyes 2024), the ability to understand artifacts and symbolic behavior (Colagè & d'Errico 2020; d'Errico & Colagè 2022; Tylén *et al.* 2020), and the sense of quantities and numbers (Harper 2010).

Because cultural cognitive scaffolds are not complete or perfect solutions, this account predicts that (1) scaffolds might appear in bundles rather than in isolation; (2) they can show substantial changes between their earlier and contemporary forms (as a result of cultural evolutionary processes); and (3) they will reflect what is likely to be culturally successful in the cultural context in which they developed.

2.3 Mechanisms ensuring cooperation: Incentives, information, reputation, signals, and verifiability

Cultural cognitive scaffolds leverage only a couple of mechanisms to manage the uncertainty related to expanding exchange networks: (1) creating situations in which interests/incentives of the exchange partners are aligned; (2) distributing information, especially making possible the formation of reputations; and (3) creating ways to lower variation or making information verifiable.

2.3.1. Incentives/interests

The first of these mechanisms is to directly change or manipulate the participants' interests and incentives, for instance, by increasing interdependence between the exchange partners or creating incentives against defecting through sanctions. This is often the primary mechanism assumed or pushed forward by accounts focused on contracts or institutions. On the cognitive side, humans have a suite of cognitive processes and abilities that relate to our species' capacity for cooperation. Much of our cognitive apparatus allows us to attend, infer, and represent others' mental states (Apperly 2012; Carlson *et al.* 2013), motivations, goals, or preferences (Jara-Ettinger *et al.* 2016, 2020). All these processes enable individuals to evaluate their exchange partners' interests and likely behavior.

2.3.2 Information distribution, reputation, and signals

The second mechanism used by cultural cognitive scaffolds to manage trade's high uncertainty is to influence or alter information distribution. The importance of information distribution in the history of trade cannot be overstated. Information scarcity and informational asymmetry are detrimental to cooperation and exchanges (Akerlof 1978). Signs of the importance of information distribution in trade is evident in the development of trade languages and pidgins (Mufwene 2015; Parkvall 2017), the extensive nature of merchants' correspondence in many different times and places (Muchembled *et al.* 2006; Trivellato 2007; Veenhof 2013), and the development of marketplaces – physical spaces where information is made more visible and circulated. More contemporary examples of the importance of information flow include the effects of the introduction of cell phones in developing markets (Aker 2010; Aker & Fafchamps 2015; Jensen 2007).

Importantly for cultural cognitive scaffolding, distributing information allows for signaling and reputation formation, which in turn can be leveraged for cooperation and exchange. Reputation is the belief held by others that a given individual possesses a specific trait or quality—for instance, being competent, benevolent, or trustworthy (Barclay & van Vugt 2015). Through partner choice dynamics, reputation formation incentivizes individuals to honor their side of the exchange. Traders are trusted because they have an interest in maintaining a good reputation if they hope to stay in business.

Cultural cognitive scaffolds that exploit signals and reputation dynamics act by shifting an unsolvable primary problem of trust—i.e., figuring out whether an exchange partner is trustworthy—to a tractable secondary problem of trust—i.e., can a given signal be reliably associated with trustworthy partners or with some guarantee of an exchange going well (Bacharach & Gambetta 2001)?

Signals are “acts in which a sender communicates information to influence the behavior of a receiver” (Smaldino 2024). A signal must be reliable to be helpful as a cultural-cognitive scaffold. The presence of a signal should be associated with a relatively high probability of a trait being present—e.g., quality, origin, or manufacturer. Informativeness, in turn, depends on how

frequently a given signal is associated with this trait versus how often it is present but not associated with it.

For instance, honest signals are those whose cost is lower for individuals who genuinely possess a trait than those who do not have the same trait, both in economic and biological markets (Grafen 1990; Spence 1978). An example of honest signaling in the biological realm is the handicap principle (Zahavi & Zahavi 1999), with a prime example being the peacock's tail. Evolving a large tail made it harder for peacocks to escape predators; thus, it can only be afforded by fit individuals. Because of the cost asymmetry of an extravagant tail for fitter versus less fit peacocks, their tails are an honest signal. Section 3 of this manuscript will show that some cultural cognitive scaffolds—such as ethnic and religious group membership (McElreath *et al.* 2003) and guilds' branding strategies (Richardson 2008)—rely on signaling.

Alternatively, signals tied closely enough to behaviors could also allow for tag-based cooperation without the need for reputational formation per se (Riolo *et al.* 2001). In this case, individuals choose to cooperate preferentially with those who present a given tag—an observable and hard-to-fake characteristic. Tag-based cooperation can occur only as long as the presence of the tag is reliably associated with cooperators and can resist invasion by free-riders or defectors. Accent is one example of this phenomenon (Cohen 2012; Cohen & Haun 2013).

2.3.3 Verifiability

Finally, another way to manage the uncertainty of an exchange is to directly make properties of the goods exchanged (e.g., through standardization) or past exchange history (e.g., records) verifiable. Uncertainty can be managed by bounding risks and making them representable, as when a signal is reliably associated with a known and reasonably high probability that what is acquired through an exchange would be accepted in other exchanges (e.g., money) or when the possible variation in what is obtained is strongly curtailed (e.g., standards).

Another way to avoid the need for trust is for aspects of the exchange or other relevant pieces of information to be directly verifiable. Rather than relying on social interaction to assume product quality or partner trustworthiness, this information sometimes can be directly verified (e.g., records of a history of previous exchanges, crypto-currencies, and other “trustless” financial institutions). When the entire history of transactions can be directly accessed, there is no need to trust a central institution, such as a bank. Notably, making relevant information verifiable, especially absent face-to-face interactions or personal relationships, often relies on artifacts, such as packages or records. As such, it recruits our cognitive abilities to understand artifacts, including to know whether they have been altered or not.

3. Taxonomy: “Who” and “what” practices

The different cultural cognitive scaffolds that participated in the expansion of trade networks can be roughly distinguished into two main categories: whether they represent and allocate trust to (1) someone (e.g., an agent or a group of agents) or (2) something (a signal or a proxy) (see Figure 2). The former practices range from recruiting economic partners preferentially from kin to using intermediaries and foreign traders. The latter ranges from branding goods to using money and record-keeping. This taxonomy ascribes to the idea that some practices involved in

the cultural-cognitive scaffolding of exchanges build directly on cues related to interpersonal relationships, including cues of group belonging, while others represent cases in which the cues used are material mediators, per se. All the cultural practices presented here have their rich scholarship, most of it dispersed in the humanities and social sciences. Figure 2 and the sections below overview these diverse cultural practices and demonstrates how they function as cultural-cognitive scaffolds.

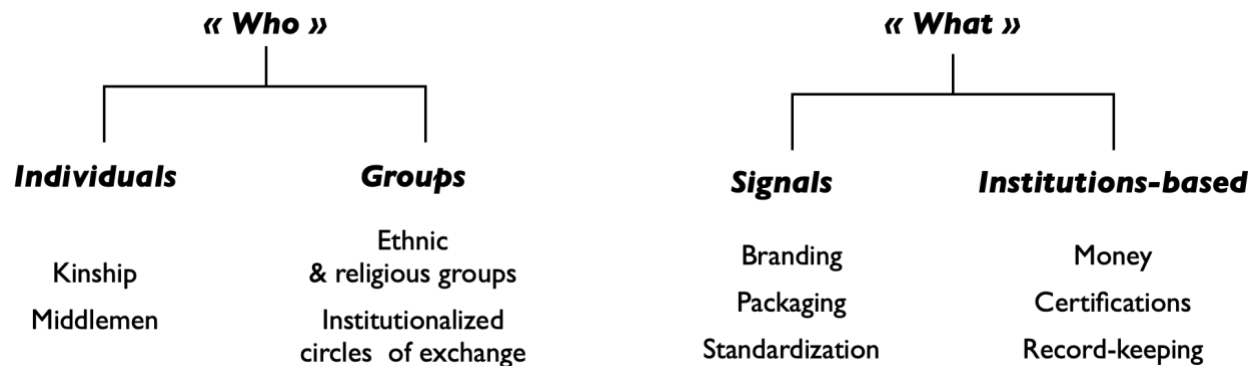


Figure 2. Taxonomy of practices underlying the expansion of exchanges

3.1 “Who” practices

“Who” practices are cultural practices that establish or maintain trust between individual agents, including kin or intermediaries, or groups of agents, such as ethnic and religious groups or institutions. Such practices create incentive structures in which it is in the interest of both agents to conduct trade rather than for one or both to defect or cheat on their exchange partners. “Who” practices create incentives for potential exchange partners to uphold their part of the exchange – either directly through personal relationships or less directly controlling the future exchange opportunities of the individuals involved (sometimes by controlling reputational information).

3.1.1 Trusting individuals

3.1.1.1 Kinship

The family has been an essential institution in the development of trade in many different contexts over history, including Mesopotamia (Garfinkle 2010, 2015; Stolper 1985; Wunsch 2012) and Early Modern Europe (Trivellato 2009). Even today, family businesses persist as a form of organization (Anderson & Reeb 2003; Gómez-Mejía *et al.* 2007; Villalonga & Amit 2006).

Kinship can lead to cooperative and seemingly altruistic behaviors (Hamilton 1964). Kin members’ payoffs are typically interdependent, and kinship can be used in the context of exchange to create or leverage such interdependence. This can be done by preferentially recruiting economic partners among kin members using kin-related terms and institutions to recruit and secure economic partners. The interdependence applies to both real (i.e., based on biological relatedness or through marriage) and fictive kin (i.e., kin terms and related social

norms for individuals who aren't directly biologically related). In the case of biological kinship, an individual has interests in their kin because of their shared genes. In contrast, in the case of fictive kinship, an individual has interests in their kin because they share similar expectations (including reciprocal help and provision of resources) as they would with biological kin. Kin also creates the possibility of having economic exchanges with a longer temporal horizon when it is expected that the family business will be pursued by someone's descendants, thus surviving the death of the immediate exchange partner. It also allows for legal or institutional protection because institutions related to property rights, inheritance, and marriage most likely preexisted trade networks.

Recruiting kin members as economic partners is limited by the finite number of available family members. The practice is typically found in relatively small-scale economic activities, such as maintaining a shop in a bazaar (Fanselow 1990) or herds of cattle (Ensminger 1996). Merchant ship captains were also occasionally recruited among kin (Davis 2017).

Two ways of expanding kin are through marriage or fictive kinship. Marriage to local women, explicitly as a way to benefit from their social and economic networks, has been used in the context of expanding exchanges by European traders both in Asian countries (Pomeranz & Topik 2017) and in the fur trade (Kirk 1993; McLaren *et al.* 2002; Sleeper-Smith 2001). Fictive kinship can also grant individuals status and advantages (including economic ones; see Ensminger 1996), and create interdependency between individuals' payoffs (Cronk *et al.* 2019; Roberts 2005). Some traditions, such as the *iemoto* system in Japan, have used fictional kinship to expand a family's economic unit (typically, a craft workshop) by making an apprentice part of the family (Singleton *et al.* 1998).

Notably, not all uses of kin and kin institutions promote exchanges beyond local contexts, and kinship might be inherently limited in the degree to which it can expand exchanges. An emphasis on kin, close relationships, and strong kin-related institutions can also come at the expense of not developing more generalized trust in strangers, which ultimately harms economic development (Bahrami-Rad *et al.* 2022; Moscona *et al.* 2017; Umbres 2022). As an example, some of the discussion of the "Great Divergence" between Europe and China's economic outcomes (Pomeranz 2021) has focused on their differing reliance on institutions and loyalty groups (Greif & Tabellini n.d.).

3.1.1.2 Intermediaries (middlemen and merchants) as "professionals of trust"

Over time, exchanges over large physical and cultural distances increasingly became *mediated*, involving agents that neither produce nor consume the goods exchanged. Intermediaries can go by a variety of labels—traders, merchants, middlemen, dealers, brokers—depending at times on stringent definitions, such as whether or not they take ownership of the goods they exchange (e.g., van Driel 2003).

The fact that cooperation via commercial exchanges has scaled up by involving *more* agents, rather than fewer, can make intermediation seem paradoxical. Even for the most straightforward transaction between a seller and a buyer, introducing an intermediary adds another individual and another transaction, thus requiring more cooperative events to proceed smoothly than would

have been required in a direct transaction. The rise and omnipresence of intermediaries has typically been understood through the potential economic (including informational) advantages they can provide.

A detailed ethnographic study of the practice of *La Maroma* in chile trade (Alvarez 1998) describes how Mexican traders balance variation in market conditions. Traders typically knew more producers (or sellers) and remote ones than buyers would, thus enabling them to provide buyers with chile even when supplies are low—for instance, due to bad weather. A study of brokers and auctioneers in Anglo-Indian trade also suggests that intermediaries reduced volatility in the indigo market through the information they circulated (Aldous 2017).

Another critical function of intermediaries is to evaluate and sort goods by quality. Intermediation increases market efficiency through a better match between the quality of products and consumers' (buyers') preferences (Johri & Leach 2002). This sorting function is salient in contemporary, globalized, and heavily institutionalized contexts, such as the trade in raw fish between the Northeastern coast of the United States and Japan's largest fish market, Tsukiji, in Tokyo (Bestor 2001). This sorting function is also found in historical episodes, including the coffee (van Driel 2003) and cotton (Aldous & Coyle 2021) trades. The role of intermediaries helps to explain why they might especially be found in the trade of goods with quality variation that requires some expertise to be evaluated.

From a network standpoint, intermediaries can *reduce* the number of links required to connect an economic network of buyers and sellers, compared to an alternative in which producers and consumers are directly connected (see Figure 3). Using an intermediary allows traders to access resources and goods from several suppliers (or sellers) while needing to trust only one agent (the middleman). Rather than each producer trusting each trader (i.e., a completely connected network), each trader and each producer need only trust one intermediary. In such a centralized network, intermediaries can bring one new economic partner to the exchange network by forming just one additional trusted connection. Overall, they reduce the costs of looking for and establishing relationships with new exchange partners.

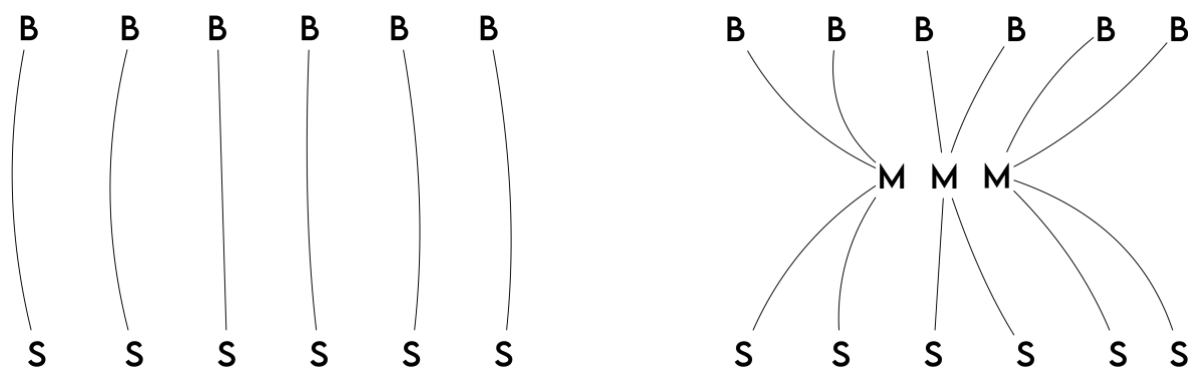


Figure 3: Illustration of the effect of intermediaries on networks. Without an intermediary, each buyer (B) in the economic network has to be directly connected to each seller (S), as shown on the left. For a network of six buyers and six sellers with six links, each buyer could access only one seller (and vice versa). Introducing intermediaries (right) adds three more nodes to the

network. While each buyer has only one link (to the intermediary rather than to each other), they can access twice as many sellers as before.

When seen as a specialization, intermediation is an especially attractive option for individuals already positioned in social networks between buyers and sellers, and for individuals who understand how to navigate different social and cultural spheres (hence, as described below, the affinity with ethnic/religious groups).

Intermediation has a self-sustaining character through reputation mechanisms. It is in the merchants' interest to have a good reputation. Their economic activity depends directly on being trusted and chosen to interact with producers and consumers; in this sense, reputation can secure cooperation in the same way as through partner choice (Barclay 2013, 2016, 2020; Sylwester & Roberts 2013). The constraints on intermediaries' behavior are similar to those observed in evolutionary economic games modeling the evolution of cooperation by partner choice. Because intermediaries' payoffs are tied to their probability of being chosen as economic partners, it becomes in their interest to behave in ways that improve their reputation – regulating their cut, for instance. Middlemen are “professionals of trust”: their economic value stems from and depends on their social network and their reputation in this network, which has been explicitly acknowledged in economic history (Coulon 1999; Greif 1989).

3.1.2. Trusting groups or individuals

People can also be trusted by virtue of their belonging to a given group, such as ethnic and religious groups or specific institutions. Group belonging can be used as a marker of trustworthiness and as the basis for making inferences and predicting strangers' behaviors (for a contemporary example, see Gambetta et Hamill 2005). People who are part of an institution are also part of a group, allowing inferences to be made regarding whether to engage in exchanges with them. To effectively function as a cultural-cognitive scaffold, these groups need to fulfill two related criteria: (1) facilitating exchanges and cooperative behaviors within the group while (2) also being a reliable signal to outsiders.

3.1.2.1 Ethnic and religious groups

Ethnic and religious groups have been notoriously important in cross-cultural trade (Curtin 1984). Diamond trade has been one well-studied case (e.g., Bernstein 1992; Richman 2015), but ethnically homogenous trade domains have been observed in many places and specialties. Janet Landa (1981, 2008, 2016) fits numerous observations of such “middlemen groups” within a multi-level selection model known as the theory of the ethnically homogenous middlemen groups. Her theory builds on her fieldwork among Chinese merchants in Southeast Asia, as well as others' observations of similar phenomena, including Jains-Marwari traders in India (Iyer 1999; Laidlaw & Laidlaw 1995), Indian merchants in Central Africa (Dotson & Dotson 1968) and South Africa (Godsell 1991), Lebanese traders in West Africa (Dotson and Dotson, 1975), and Jewish merchants, whether in medieval Europe (Zenner 1983), Tunisia (Udovitch and Valensi 1984) or in present-day Antwerp, Amsterdam, or New York (Gutwirth 1968).

Landa's theory of ethnically homogeneous middlemen groups (EHMG) states that when contract uncertainty is high, a rational trader will not enter exchanges with anonymous traders but instead will base their decisions of whom to exchange with on a "calculus of relations" (Fortes 1969) that sorts potential exchange partners according to their degree of kinship or social distance. Smaller social distances are associated with higher degrees of trustworthiness in honoring exchanges. Conversely, the larger the social distance to a potential exchange partner, the less likely a trader is to exchange with them. In this ranking system, ethnic boundaries coincide with a decrease in the perceived trustworthiness of others: Individuals from the same ethnic group as the trader are considered more trustworthy and preferentially selected as exchange partners than individuals from different ethnic groups.

Ethnic and religious group belonging is an honest signal for outside partners (outgroup). It is associated with better quality and circulation of information, along with incentives *within* the group (ingroup) to behave as a good economic partner. The advantages of ethnic and religious groups are said to apply both within an ethnic or religious group (such as sharing cultural norms) and with outsiders (as a signal). Recent work on merchants' correspondence (Trivellato 2009) suggests that group boundaries were frequently crossed in trade and informational networks, hinting that group identities and boundaries would not have restricted trade.

It has been suggested that using ethnic groups—and their markers as cues—has several advantages: (1) they tend to be honest signals (i.e., their cost is lower for the individuals who have the characteristic than individuals who do not have it), (2) they can become self-reinforcing, and (3) they are types of signals that are easy to process by previously evolved cognitive faculties. Ethnic markers are, more often than not, an honest signal (Bowles & Gintis 2004; Landa 1981, 2008, 2016; McElreath *et al.* 2003); this makes them particularly useful for cooperation based on partner choice. Ethnic markers, whether accents, dialects, or other cultural practices, have to be learned. The costs of learning the markers of belonging to an ethnic group are lower for people who belong to the group than they are for outsiders, who will find them more difficult and costly to fake. For example, learning an accent by growing up in a given cultural group has a lower cost than learning to fake this accent later in life without direct exposure to it (Cohen 2012).

3.1.2.2 Institutions

Institutions have increasingly been seen as a significant factor in economic growth and success (e.g., Acemoglu *et al.* 2014; Acemoglu & Robinson 2012; de la Croix *et al.* 2018; Greif & Tabellini n.d.; North 1990). They have been defined as "the humanly devised constraints that structure political, economic, and social interaction," consisting of "informal constraints (sanctions, taboos, customs, traditions, and codes of conduct) and formal rules (constitutions, laws, property rights)" (North 1991 p. 97). According to North, people have devised institutions to "create order and reduce uncertainty in exchange." Other definitions add the requirement that institutions have a lasting effect as "the laws, informal rules, and conventions that give durable structure to social interactions in a population" (Bowles 2004 p. 47). Institutions are also frequently considered rule-based equilibria, sustained by the incentives and expectations they create and allowing individuals to coordinate to solve different problems, including some far

beyond the scope of exchanges (Guala 2016). Other scholarly works have, relatedly, emphasized how institutions impact how their members think (Douglas 1986).

Institutions can also be seen as a “cooperative pulley” for sustaining cooperation in difficult cooperative dilemmas (Lie-Panis *et al.* 2023). The cultural cognitive scaffolding hypothesis allows us to specify which institutions may have helped further exchange beyond local contexts by managing uncertainty through the mechanisms presented above. The set of institutions most likely to serve as cultural-cognitive scaffolds share the following set of properties: (1) they control who enters the institution and trade within it, (2) they can circulate reputational information, and (3) they can punish misbehaving individuals, most often by excluding them from institutions. Examples of such institutions include Champagne fairs (Milgrom *et al.* 1990), Diamond Bourse arbitration boards (Bernstein 1992; Richman 2015), Liverpool Cotton Brokers’ Association (Aldous & Coyle 2021), and merchant guilds (Greif *et al.* 1994). This set of properties allows this specific subset of institutions to recreate favorable conditions for cooperation through the individual incentives they create for their members.

In all such cases, the institution ensures that its members obey specific rules and standards, as defecting usually leads to exclusion from the circle. Institutions can also ensure that their members’ reputations are truthful. Such institutions (1) judge and sanction cases in which a trader has not fulfilled its obligations and (2) ensure the collection and diffusion of information relating to specific traders’ reputations. In Champagne fairs (Milgrom *et al.*, 1990) and Diamond bourses arbitration (Bernstein 1992), for example, traders are subject to trade rules, can be vetoed by the institution, and have access to reputational information about other traders that belong to the institution.

Such institutions recreate conditions for cooperation; overall, exchanges inside them are less uncertain than exchanges outside of them. They ensure that the institution remains an honest signal by ostracizing or banning those who have proven unreliable or disappointing. However, under the cultural cognitive scaffolding hypothesis, institutions can make situations less uncertain because they change what individuals believe can happen within their scope, beyond how much they can reduce risks. This builds on the idea that individuals prefer a more certain distribution of outcomes over a more uncertain distribution with equivalent or better possible outcomes.

Various arguments have suggested that actors can trade without the help of institutions or that institutions have limited impact. First, institutions are typically limited by the preferences of some economic actors to exchange or do business *outside* of them. Extra-legal and private order arrangements have been preferred, and often are found sufficient, in many times and places (Aldous & Coyle 2021; Bernstein 1992; Clay 1997; Leeson 2014; Ricard 1722). Although this may have limited the development of *public order* institutions, they still would have been part of institutional development at large, with different institutions playing a role in separating different market segments (cf. what happened *en marge* of the Chicago Board of Trade). Other challenges in the development of institutions and their capacity to scaffold trade include their tendency to be costly (especially in ensuring monitoring and punishment), limited in scope (time, space, and which goods they would oversee), and frequently too slow to evolve to provide efficient legal protection, especially across territorial boundaries (e.g., Diamond 1983).

3.2 “What” practices

In contrast to the “who” practices described above, “what” practices exploit *material* proxies or signals (“something”) rather than representations of individuals or groups (“someone”). The first set of such practices transforms goods or their packages into *commodities* – i.e., exchangeable goods, including practices like branding, sealing and packaging, and standardization. The second set of practices for transferring trust from the exchange partner to artifacts include record-keeping, money, and diverse forms of certifications. The material nature of these cultural and cognitive practices allows for the duplication, distribution, and sometimes verification of information.

In turn, because actors trust artifacts and signals instead of the individual with whom they conduct the exchange, direct trust in the sellers of goods is not needed. In some cases, such as branding, actors rely on trust with an “unseen” other. In other cases, such as money or standardization, actors can bypass the need for trust, per se, either by making certain properties or past records verifiable or curtailing possible variation. Both mechanisms contribute to changing unbounded uncertainty into bounded risk.

3.2.1 Trusting goods: On commodification as a cognitive novelty

Some signals that can be trusted take the form of the traded objects. In David Wengrow’s work on commodity branding (Wengrow 2008), the emergence of commodities, or *interchangeable* goods, is one significant cultural innovation. When exchanged goods are commodified, they can be identified, standardized, and quantified (Bevan & Wengrow 2016; Wengrow 2008). Developing an overall transactional system based upon the circulation of substitutable (standardized) goods and labor is often called commodification “brand economy” (Fanselow 1990).

3.2.1.1 Branding

Branding initially referred to the practice of altering goods in distinctive ways (Bevan 2010). Branding still takes diverse forms, from adding a mark—a printed or engraved logo, for instance—to using a characteristic of the product itself. For example, cloth selvedges (the tightly woven edge of a fabric) can reliably be used as a shortcut to estimate cloth quality, including by customers who have a limited understanding of cloth manufacturing (Clark 2016).

Branding can function as a reliable proxy for inferring quality, directly or by referencing who produced the given goods. As signals directly associated with the product, branding marks allow consumers to infer the quality of a product from a trusted mark instead of needing to trust information offered by individual traders. Geographic provenance and the producer’s identity, frequently conveyed through branding marks, provide a possible basis for reputation and future interactions. Additionally, branding can be used to signal property or ownership, and thus aid in ensuring property rights.

Some instances of branding have been honest signals (Zahavi & Zahavi 1999), for example, in the context of guilds (Richardson 2008). Guilds often purposefully produced goods with features that were difficult to replicate by keeping manufacturing methods secret or using specific raw materials that could be acquired only locally (e.g., Damascus steel) and specialized hardware (e.g., fabrics/textiles that came in specific widths due to the loom required by the manufacturing process) (see Richardson 2008 for more detail). By adopting these strategies, guilds strived to homogenize and maintain the quality of the goods they were producing (Richardson 2008) (but see Ogilvie 2014, n.d., for possible limits on their effectiveness).

Branding becomes more important when a product's quality cannot be evaluated before the transaction. In other words, branding should be especially crucial for experience goods—those whose quality is ascertained upon consumption. The use of branding as a trusted signal can be assumed to work reasonably well under the following conditions: (1) there are *actual differences* in quality between products of the same type, (2) these differences in quality are not readily observable, and (3) it is reasonably easy to reliably recognize and infer the quality of the goods from the brand. The efficiency of this strategy also depends on the frequency and quality of counterfeit products and how difficult it is to forge the branding or trademarks. The more frequently well-made counterfeit brand marks appear on lower-quality goods, the less valuable the practice of branding becomes.

3.2.1.2 Packaging

Packaging refers to the various ways in which goods can be packed and protected. It takes multiple forms. Sealed packaging can ensure that the product stays unaltered between the producer who seals it and the consumer who opens it. Goods can be packaged and sealed at the end of their production or moved in bulk and packaged only before being sold to the customer. For instance, in Victorian England, merchants would check the quality of tea from China to ensure the tea had not been adulterated and then package it, as consumers were suspicious of Chinese producers (Rappaport 2006). During Antiquity, sealed cases ensured the goods would not be tampered with during their transport around the Mediterranean. Amphoras and other containers seem to have played an important role in the development of exchanges across the Mediterranean since the Bronze Age (Bevan 2014; Twede 2002), a trend that intensified during the first millennium BC, allowing for more storage of diverse goods (Bevan 2020). Trading across maritime space also brought another contemporary form of packaging: the shipping container. Using containers helped avoid the possible capture of goods being loaded on and off merchant ships (Levinson 2016).

The packaging of a product can signal its quality, especially if it is sealed or closed thoroughly when produced and its package is verifiably unaltered. Like branding, packaging guarantees some independence between the quality of the product and the person selling it, while also creating a link between the product and its producer, even if the producer is remote. Packaging can also guarantee the consistency of a product's quantity or quality. It also protects, to some extent, against adulteration and signals that contents have not been tampered with. Sealed packaging thus reduces the need to place direct trust in the seller. Packaging builds on verifiability and uses our understanding of artifacts: we can evaluate whether a package has been

tempered with. As we will see next, when packages have a standardized quantity, they can also recruit into the same fairness intuitions as standardized measures.

3.1.2.3 Standardizing

The third and last aspect of commodities is their standardization. Standardization can occur in two different aspects of exchanges: quality or quantity. In both cases, standardization decreases uncertainty by ensuring consistency and reducing variation in the quality of the goods produced or the quantity obtained.

3.1.2.3.1 Standardizing quantities: The history of measures and their use

Quantities have become increasingly standardized, primarily through the use of measurement units. The early use of measures, at least in the Mediterranean world, most likely occurred within local transactions rather than as standardized tools (Johnstone 2011; Riggsby 2019). However, recent work has suggested that adjusting weights between traders through one-to-one interactions would have been sufficient to create a relatively reliable and unified system during the Bronze Age (Ialongo *et al.* 2021). In the agora, this would have been complemented by using witnesses to guarantee the measures used; thus, products were still extensively backed by more personal, face-to-face trust (Johnstone 2011). Overall, standardized units would have been helpful early in their development *within* rather than *across* transactions by allowing comparison on the spot on markets and directly during transactions themselves. Individuals who needed to judge quantities regularly could have developed a reliable ability to do so “at a glance”!

This would contrast with later contemporary contexts, where standard measures introduce invariability, with the (relatively late) widespread use of “universal” measures such as the meter or the kilo (Vincent 2022). It is also worth noting that the development of *universal* measures was sometimes a scientific inquiry rather than a pragmatic one, as in the case of the meter (Giunta 2023).

Standardization sometimes occurred in the context of formal institutions (e.g., early states), including for tax collection. In this sense, the institutional context of the development of standardized units correlates with deliberate attempts to appear fair, as standardized units also matter to fairness intuitions. Standardized units make cheating on quantities or adjusting them more difficult based on personal relationships, such as a merchant heaping grain for a return customer (Fanselow 1990). Standardized products can be trusted instead of the person. One example of how standardized measures are seen as fairer was the demand for unified standards of weights and volume at the dawn of the French Revolution (Alder 2020; Gillispie 2004).

A final benefit of standardized measures is that they enable comparison. If quantities of a type of good offered by different sellers in a market are the same—and in some cases, prices as well, as in the case of heroin in New York City (Wendel & Curtis 2000)—then the quality of the product is the only dimension that is left to vary. Thus, quality is the only characteristic that a buyer can maximize; the buyer can try to find higher-quality heroin, but not cheaper heroin, as all sellers use the same price for the same quantity. Additional evidence suggests that the development and

spread of standardized measurement units occurred, at least in part, in the context of intercultural trade (Cooperrider & Gentner 2019).

3.1.2.3.2 Standardizing quality: Creating categories

Standardization can also apply to the quality of goods exchanged. For instance, the Chicago Board of Trade created “almost-brands” of cereals (e.g., wheat) of standardized quality in a way that supported the creation and expansion of markets for cereals in the United States (Cronon 2009). Additionally, some aspects of the production process can lead to standardized product quality: e.g., using looms results in homogeneous fabric dimensions, and using molds leads to homogeneous production. In several cases, merchants (intermediaries) have created and used different grades or categories of quality for various types of goods (Aldous 2017; Aldous & Coyle 2021; van Driel 2003). At a cognitive level, this bounds variation in quality and, thus, uncertainty.

3.2.2 Trusting institution-backed signals

Other “what” practices (e.g., money, record-keeping, certifications) and their reliability, impact, and scalability depend on the institutions that back them up. If the institution that guarantees the practice is legitimate and has a wide sphere of influence, practices can exploit and piggyback on the institution’s reach.

3.2.2.1 Certifications

The first type of proxy backed by institutions used to scaffold the expansion of trade is certifications. As a special case of branding by an institution, certifications can be trusted as a guarantee, proxy, or signal of a product’s quality, authenticity, or other property. Importantly, certifications rely on being provided by an institution.

Certifications by an authority, especially a sovereign, can be found in various contexts. For example, sophisticated calligraphed marks or signatures have abounded in diverse historical, geographical, and political contexts. Known examples include Georgian *khelrtva* and *Kao* (Huaya) in China and Japan, which both required expert knowledge to be deciphered and used, as well as Ottoman *Tughra*, pope’s *rota*, seals, royal ciphers, monograms, signatures (including modern electronic versions), LMLK seals (« of the king » ancient Hebrew, on jar handles), and more. In most contemporary settings, institutions provide certifications, and there can be legal consequences for misuse of the certification mark. Certifications are also associated with higher market prices, as on the auction website eBay (Dewally & Ederington 2006). The reach of this cultural practice depends on the legitimacy and reach of the institution that provides the certification. Certifications could help support trade expansion when an institution’s reach exceeds the current trade network. Certifications also played an important role in guaranteeing standards for quantity and quality. A certification provides cultural cognitive scaffolding to the extent that it is (1) an honest signal and (2) stabilized because it is represented as a guarantee of value *to others*. Both aspects curtail the possible variation in outcomes, thus contributing to managing uncertainty.

3.2.2.2 Records

Record-keeping refers to preserving information in a permanent form, or, more precisely, treating records as persistent representations of activities (Yeo 2008). Record-keeping has taken various physical shapes: as knotted threads (such as the Andean khipu (Quilter & Urton 2002; Urton 1998, 2003, 2005), tallies (Baxter 1989; Stone 1975), tokens (MacGinnis *et al.* 2014), or specific writing systems mainly used for record-keeping, if not only for that purpose (Basu & Waymire 2006). Other notable early, non-writing-based record-keeping systems include string notations used by the Salish in the American Northwest (Leechman & Harrington 1921). Tallies are arguably one of the oldest forms of records. Split tallies, in which each party keeps a side of the tally on which marks are made, allow exchanges to be easily monitored and verified by both parties. In most (if not all) known cases, records in the ancient world appear to have been created on the initiative and impulse of early states to fulfill the needs of elites and early forms of bureaucracy (Nissen *et al.* 1993; Posner 1972; Yeo 2021).

In these various forms, record-keeping provides a way to coordinate and formalize an agreed-upon transaction, with the possibility of referring to the record in case of disagreement. Record-keeping and accounting institutions have been assumed to have an important role in the emergence of complex societies, although the exact nature of this relationship is still debated (Kohler *et al.* 2022; Shin *et al.* 2020; Turchin *et al.* 2018).

Record-keeping creates incentives for being a good exchange partner by providing records of past behavior and assisting with reputation formation. Records also reduce uncertainty through verifiability: information does not have to be stored in memory and can be checked in case of disagreement. Record-keeping would have played an important role in the emergence of complex societies, such as early states, by solving problems of cooperation and leveraging the possibility for reciprocity, reputation, and social norms (Basu *et al.* 2009; Basu & Waymire 2006; Mullins *et al.* 2013).

Records and record-keeping practices also reflect a decent amount of cultural evolution. Early records from private parties (typically families) seem to have been used in relatively unsystematic ways (Johnstone 2011; Riggsby 2019). Early writing and more systematic record-keeping most likely appeared in the context of early forms of administration, including during the Uruk expansion (Nissen *et al.* 1993) and in the Indus Valley (Ansumali Mukhopadhyay 2023). In this context of early states, the development of accounting and record-keeping practices would have been driven by the informational needs of elites. This context also hints at the importance of the verifiability and perceived fairness of records.

3.2.3.3 Money

Money has been the focus of a rich and dense scholarship. Money has often been defined by its functions: medium of exchange, measure of value (or unit of account), or store of value (Polanyi 1957). Monetary theory typically focuses on the role of money in avoiding frictions and bridging informational gaps. It is seen as a significant innovation that solves the double coincidence of wants, allowing exchanges to generalize from barter, as individual wants no longer have to match for an exchange to occur (Jevons 1875). Once money is introduced, the probability of an

exchange happening depends only on the likelihood of one agent wanting the exchange. More recent approaches (Ferguson 2008; Graeber 2014) have suggested that money is more likely to have evolved from forms of debt, credit, and other (reciprocal) obligations. Relatedly, extensive psychological, anthropological, and sociological scholarship has highlighted that money is embedded and understood through social interactions (Parry & Bloch 1989; Zelizer 1989). Money has also taken diverse physical forms, from shells to large, heavy Rai stones to our familiar coins and banknotes (Fitzpatrick & McKeon 2020; Weatherford 2005).

Two properties of money allow it to function as a cultural-cognitive scaffold: (1) the comparability and commensurability that it affords, which is key in bounding and reducing uncertainty, and (2) how it is guaranteed through physical features and institutions. (2) builds on how money works by being believed to be valuable in future transactions and has seen considerable variation over history.

First, money creates comparability and commensurability, important aspects of quantifying and comparing possible transactions. These properties are usually achieved through money's "ideal" property of divisibility, which allows us to harness our sense of quantities (Leibovich *et al.* 2017; Thomas & Morwitz 2008). The possibility of quantifying also implies that the introduction of money might have increased the informational asymmetry between buyers and sellers. Sellers knew what they would get from the exchange (a monetary amount), while buyers did not – at least, in Ancient Greece (Johnstone 2011). Perhaps surprisingly, this introduction of money reduces uncertainty for buyers, as well: Although it does not reduce the risks they take in an exchange, *per se*, it reduces the amount of uncertainty by clarifying how much the buyer would lose—namely, the amount they pay. Rather than an unbounded representation of what they might lose in the exchange, money allows buyers to estimate an upper bound as to how much they might lose. The possibility of mediating exchanges through money would also have had a significant cognitive effect: It would have made it easier to exchange very different goods by introducing a common standard of value for them to be measured against and a universal means of exchange that could be traded against any goods. What is considered fair differs depending on whether money is used or not (DeVoe & Iyengar 2010). Money and commensurability have also been theorized in anthropology to be the core of the "market pricing" relational model (Fiske 1993; Haslam & Fiske 1999).

The effects of money depend on the expectation that it will be accepted as a medium of exchange in the future and that its value will not change dramatically. Experimental evidence also suggests that mediating cooperation and economic games through tokens—equivalent to money—leads to more sustained, larger-scale cooperation (Bigoni *et al.* 2019; Camera *et al.* 2013). Ensuring the future acceptability of money in exchanges can leverage two related mechanisms: exploiting the physical aspects of money (making it hard to counterfeit or giving it an artifact or material with a market value independent of it being money) and as an artifact because other institutions support it.

Several physical features of money themselves can be taken advantage of. Properties of goods or materials that can make them suitable for use as money have included their durability, scarcity, divisibility (Jevons 1875; Menger 1892), and relative independence from fluctuation in demand. Durability and relative independence from fluctuation in demand would ensure that money can

be trusted to remain valuable in the future. Monies often take the form of artifacts that have verifiable features: coins are edged so that their metal cannot be scrapped off, bank notes include multiple features that are hard to copy but easy to test, and counterfeit money is actively pursued and punished in most contemporary societies (Finlay & Francis 2019). In Ancient Greece, officials frequently controlled the quality of money, especially that from another polity or place, as metals were required to be reminted as the polity's currency. This process controlled their weight and purity.

Institutions in which monies are embedded play another critical role in how they can be believed to be valued in future transactions as well. If money functions as a "trusted artifact," then the transition from commodity money to fiduciary money will only occur when it can be backed by strong enough institutions. By contrast, high-value metals (e.g., gold) might co-exist with coinage without being minted, as in Han China (Scheidel, 2008). Once money is fiduciary, it can no longer operate as an efficient cultural cognitive scaffold in cases such as hyper-inflation, where money is devaluated at a breakneck pace (the most extreme example being post-World War II hyperinflation in Hungary, where prices doubled every 15.3 hours) or when its fungibility is no longer ensured (either because money itself or some of the goods money would be exchanged for are in short supply). The view of money evolving out of obligations (e.g., Graeber 2014) would also be compatible with the evolution of money from a personal to a less personal and more scalable cultural practice.

Like records, money is a cultural practice that bypasses the need for direct, personal trust in an exchange partner and reduces uncertainty rather than expanding the scope of interactions that can be secured through personal trust. Money also shows substantial variation and evolution through time, reflecting the cultural and social contexts in which it developed, was used and refined, or abandoned. There is also a continuum between some types of records, such as ledgers, and some types of monies, such as cryptocurrencies, rather than a sharp divide between these two categories. Like records, money also seems to have seen its diffusion bolstered by early states, although traditional views (Menger 1892; Polanyi 1957) attribute the emergence and diffusion of money to the development of markets rather than to early states.

4. Discussion

This final section highlights how the cultural-cognitive scaffolding hypothesis provides (1) an overarching account and allows us to make sense of a fragmented literature and (2) a cultural evolutionary account that makes specific predictions.

4.1 Cultural-cognitive scaffolding as a pluralistic framework

The cultural-cognitive scaffolding's first contribution is to provide a unifying framework that accounts for the diverse cultural practices that often have been described in a more piecemeal (but in-depth) manner. The set of cultural practices here is broader than what is usually considered within this literature. We have highlighted how they can still be understood through one common framework, which additionally sets precise criteria for cultural practices to have the right characteristics to be effective cultural-cognitive scaffolds.

This framework contributes to the scholarship on cultural evolution and economic outcomes, which is part of “deep roots” economics (e.g., Nunn 2009; Nunn & Wantchekon 2011; Spolaore & Wacziarg 2013). New Institutional Economics set out to more deeply integrate cognitive science in an understanding of historical economic dynamics, the development of institutions, and their effects. Douglass North suggested focusing on learning processes and shared mental models (Denzau & North 1994; Knight 1997; Knight & North 1997), a suggestion that was followed by a few other scholars (Caton & Lopez 2018; Frolov 2021, 2022; Mantzavinos *et al.* 2004). This manuscript suggests the form such works could take.

Another contribution of this framework is its acknowledgment that expanding exchanges beyond local contexts can be helped in different ways by different cultural practices. Creating ideal conditions to manage uncertainty sufficiently well often happened through a combination of several scaffolds rather than only one scaffold in isolation. The attentive reader may have noticed that many scaffolds came in bundles. Frequently, “what” scaffolds were innovated by specific actors also happened to be part of the “who” scaffolds. Ethnic and religious groups have frequently specialized in intermediation (Landa 2016). Intermediaries have actively contributed to establishing quality standards (Aldous & Coyle 2021; van Driel 2003). Records, standard measures, and money tended to co-occur and seem to do so in their unified (rather than local and idiosyncratic) variants in the context of early states (Scott 2020). This is to be expected, as the agents and social structures that served as “who” scaffolds would have been uniquely placed for innovating and developing the “what” practices.

4.1.1 Who / what is only loosely related to the relationship between expanding the scope of trust vs. bypassing the need to trust

Trust has been defined in multiple ways in distinct disciplines, including psychology (Evans & Krueger 2009), political science (Hardin 2002, 2006), philosophy (Faulkner & Simpson 2017; Simon 2020), and sociology (Bacharach & Gambetta 2001; Cook 2001; Cook & Santana 2020; Gambetta 1988; Möllering 2001; Simmel 1950). In addition, trust has been an increasingly important topic in global history (e.g., Aslanian 2011; Forrest & Haour 2018; Trivellato 2009) and economics (Nunn & Wantchekon 2011). Because of the diversity of definitions of trust, which only partially overlap (see Chapter 1 (Castelfranchi & Falcone 2010) for a review), it is difficult to take a strong stance on the role of trust in the development of exchanges. A cultural practice might be seen as increasing trust under one definition but not under another. For instance, Russell Hardin’s definition (Hardin 2002, 2006) requires one’s interests to be *encapsulated* in those of others. In contrast, Gambetta (1988) and others define trust based on the subjective probability of another individual’s behavior. Trust can also be defined at different levels, scales, or contexts, ranging from within one specific dyadic relationship (Korsgaard *et al.* 2015) to how large populations trust entities such as “the state” or different groups of people, such as strangers (Bjørnskov 2007).

Research on trust and psychological adaptation to cooperation through partner choice usually stresses two main factors that influence our choice of whom to trust and cooperate with: competence (ability to confer benefits) on the one hand and benevolence (or trustworthiness/willingness to confer benefits) on the other (Barclay 2013, 2016). Competence and warmth (a characteristic associated with benevolence) are also the main dimensions on

which new people are spontaneously evaluated (Fiske *et al.* 2007). Given the nature of the risks that make exchanging over large physical and cultural distances difficult, we expect most of the cultural-cognitive scaffolding needed to expand trade networks to primarily target the benevolence aspect of trust.

On the one hand, some cultural practices still rely on personal trust. As exemplified in the next section, practices such as specific uses of kin, cues of group membership, or direct reputation (for intermediaries) are all built on personal trust and proxies that already existed independently—and *before*—large trade networks. Some other cultural practices, such as branding, have created “distant who”s, with a process relatively akin to personal trust (brands have reputations and, today, “personal” characteristics) despite the lack of face-to-face interactions.

On the other hand, some cultural practices manage uncertainty without necessarily resorting to trust but rather by reducing, for instance, the variation in what is obtained as part of an exchange, as in the case of standardization. In other cases (e.g., using records), cultural practices make things verifiable, meaning that *trust* per se is not needed, or at least it becomes trust in the record rather than the person. It is worth noting that the practices that tend to manage uncertainty without resorting to personal trust per se (e.g., money, records, the use of standards) tend to be pushed by early states and in other contexts in which “impersonal agents” (who might have needed to appear more “fair”) emerged. They also seem more strongly related to an increase in scale. While some (usually more recent) forms of these practices successfully manage uncertainty without requiring personal trust, they typically developed through “hybrid” stages where they were more heavily meshed into and reliant on personal trust – for instance, requiring witnesses, as for measures on the agora in Ancient Greece (Johnstone 2011). Taken together, cultural-cognitive scaffolds for expanding exchange networks span means of expanding and pushing what could be achieved through personal trust (e.g., kin) to ways of bypassing the need for personal trust.

Whether a cultural practice relies on representing a “who” or “what” is orthogonal to whether it manages uncertainty by ensuring trust or bypassing the need for personal trust: Intermediation is a “who” practice based on trust, and branding is a “what” practice. “What” cultural-cognitive scaffolds are sometimes “distant who” practices and frequently have used the support of “who”-type practices in their development (because, ultimately, reputational representations are tied to agents). Branding practices are a prime example: They often make visible and reference the manufacturer, seller, or sender of the goods. While being a signal borne by the artifacts themselves, branding marks usually refer to a person or person-like entity. “What” practices stand on their own, without “who” practices, but are often preceded by a hybrid regime of “who” and “what” practices. Standards (especially measures) and money also required a more personal type of trust during their development, with officials in charge of regularly verifying them or standing as witnesses to their use.

4.2 Cultural-evolutionary aspects of the account

Another aspect of the cultural-cognitive scaffolding hypothesis is that it is deeply rooted in cultural evolution. Here, we focus on four aspects: (1) how cultural-cognitive scaffolds

“fossilize,” (2) different aspects of how cultural cognitive scaffolds are subject to cultural evolution, (3) diffusion dynamics and co-evolution with punishment, and (4) what the downstream consequences are of the diffusion of some these cultural-cognitive scaffolds.

4.2.1 Cultural-cognitive scaffolds often “fossilize”

While witnesses are no longer frequently called upon when using standards or money, this past practice allows us to revisit the idea of scaffolds. In their impersonal and contemporary forms, some scaffolds have “fossilized” to allow exchanges without having to trust the exchange partner. These scaffolds have also become such an inherent aspect of exchanges that it might be challenging to operate without them. On the other hand, some practices’ relative importance might have declined.

4.2.2 Cultural evolution of the scaffolds

Looking at archaeological and historical records also gives us insight into how cultural-cognitive scaffolds have evolved through time. Cultural practices that serve as a cultural-cognitive scaffold will show cumulative improvements through two main types of historical/cultural evolution: (1) refinement while recruiting the same mechanisms or (2) a shift in which mechanisms they exploit. An example of refinement while using the same mechanisms can be found in packaging. Goods have been increasingly well packaged, in ways that allow better protection during transport and with packages displaying more information (Twede 2016). Money is an example that shows evidence of both mechanisms. On the one hand, the shape of money has improved considerably, as counterfeiters would verify: from roughly minted lumps of metal to coins with etched edges, and banknotes now including micro printing, security threads, watermarks, color-shifting inks, and serial numbers. But money also shifted from being an effective scaffold based on its intrinsic value and regular in-person checks of its features (e.g., the frequent reminting in Ancient Greece and early lumps of precious metals functioning as money), to being increasingly based on the trust in the institutions that issued it (e.g., checks and bank notes having less intrinsic values). Fully digital credit cards are an extreme example, where the physical basis of value has been completely abstracted out.

4.2.3 Diffusion dynamics and co-evolution with punishment reveal the mechanisms cultural cognitive scaffolds rely on

To effectively manage uncertainty, the different cultural-cognitive scaffolds tend to be accompanied by punishment. Punishment can be expected to reflect which conditions need to be maintained for the cultural-cognitive scaffolds to remain effective—which often means keeping a signal, such as a group membership or a branding mark, reliable. Punishment tends to be more reputation-oriented and exclusion-based than restorative. For example, faulty traders tend to be excluded from circles of exchanges rather than offered a more restorative alternative (i.e., paying for the prejudice caused). This is the case of institutions (such as Champagne fairs (Milgrom *et al.* 1990) and diamond bourses (Bernstein 1992) and how they preferentially use ostracism and exclusion as punishment. In turn, excluding misbehaving individuals allows that belonging to the institution or group to remain an honest signal.

Punishment should be used to deter and sanction behaviors that *increase the uncertainty* related to exchanges. Counterfeiting, for example, should be punishable because forgery renders the mark (a trusted signal) unreliable rather than because of the damage it brings to a particular individual (by compromising the trademark and the good name of its owner) – as illustrated by the development of U.S. trademark laws (Petty 2011, 2012). In an earlier European context, guilds could sue outsiders that passed inferior wares off as guild merchandise, but only if the wares produced by the counterfeiters were of inferior quality: perfect copies were not considered as defaming a guild's good name, and hence did not lead to financial reparation (Richardson 2008). This intuition was also mirrored by the moral outrage caused by Western European brands selling products of lower quality in Eastern Europe than in the West while advertising them similarly across Europe ("Europe's 'food apartheid'" 2017). Similarly, in countries where counterfeiting is common, such as Vietnam, it can be considered amoral if the signal (brand) is too well executed and induces expectations of high quality, but not if it is obvious enough that consumers are facing a copy or counterfeited item. In such cases, if poorly executed counterfeits fool the customer, it is considered the customer's fault (Vann 2006).

A main challenge in our contemporary world is thus that perception of signals might take precedence over more relevant or direct information, especially when excessive trust is put into signals rather than in economic actors. In such cases, we can expect "hiccups," such as how adhering to the gold standard as a signal of good housekeeping was somewhat unwarranted (Bordo & Rockoff 1996). Another "hiccup" happens whenever the signals (such as ratings) becomes de-correlated from what it is supposed signal (e.g., creditworthiness), as during the 2008 financial crisis (Ferguson 2008; Graeber 2014).

4.3.4 Downstream consequences: Cognitive, social, and cultural changes

The development, use, and diffusion of cultural-cognitive scaffolds also had a range of downstream consequences for the cognition of the individuals who used them and, in turn, the cultures they lived in. On the cognitive side, some cultural-cognitive scaffolds provided a context for developing specific cognitive technologies, such as accounting techniques, by building on our cognitive abilities – e.g., our sense of quantity and ability to manipulate symbols representing quantities for most accounting techniques. In turn, the development of exchanges, and the practice of exchanges in market settings more specifically, led to a new relational mode: *market pricing*, which is based on proportionality (Fiske 1993; Haslam & Fiske 1999).

5. Conclusion

In this paper, we suggested that one of the main challenges encountered during the expansion of exchanges beyond local contexts would have been high uncertainty related to one's possible exchange partner. The cultural-cognitive scaffolding hypothesis suggests that cultural practices were able to influence and rein in this uncertainty. Such cultural practices span two large categories of practices: "who" and "what," ranging from specific re-uses of kinship or ethnic and religious groups to brands and records. The diversity of places and contexts in which cultural practices occurred can be contrasted with the relatively small number of mechanisms they leveraged to either push the boundary of how much could be achieved through personal trust, or

allowed to bypass the need for personal trust altogether. Finally, the discussion highlighted a few features of this approach and how it can contribute to our understanding of the cultural practices that are part of exchanges in our contemporary world.

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