Introduction: Resilience and its dissociative disorder from an archaeological perspective

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1. Resilience, once again

> It is really wonderful how much resilience there is in human nature. Let any obstructing cause, no matter what, be removed in any way—even by death—and we fly back to first principles of hope and enjoyment.
>
> Bram Stoker, *Dracula*, 1897: 300.

With these words, solicitor Jonathan Harker expresses his cautious optimism after learning that Count Dracula finally fled from London. In doing so, Harker praises the capacity of humankind to 'fly back' to normal after threats have passed: resilience.

Human existence is both challenging and challenged. Whether it be a risk regarding one's own life, a natural disaster or a social, political, economic, or cultural crisis, we are constantly facing disturbances that undermine our everyday life. Contemplating only the history of the past century, humankind has undergone several traumatic, disruptive moments (e.g., world wars, worldwide economic crises, climate change, terroristic attacks, natural catastrophes, and the recent COVID-19 pandemic), which have resulted in significant changes to our lifestyles and behaviours. These situations produce long-lasting insecurity that, in turn, forces us to prioritise survival and adaptation by looking for strategies that might minimise future risks (Shaw 2012).

Over the last few decades, 'resilience' has become a panacea to be administered to ease this feeling of uncertainty (Davoudi 2012). Commonly understood as "the capacity to recover quickly from difficulties" (Oxford Online Dictionary 2021), this notion is now a buzzword within—and beyond—

scholarly research. Its rapid boost in popularity has been accompanied by a proliferation of thematic contributions (e.g., Berkers et al. 2003; Faulseit 2016; Gunderson and Holling 2002; Gunderson and Pritchard 2002; Rampp et al. 2019; Traynor 2017; Walker 2019; World Bank 2012; Yan and Galloway 2017), as well as by an increasing number of cross-disciplinary research projects, groups, and journals bearing its name (the Resilience Alliance research group, the Stockholm Resilience Centre, or the journal *Resilience* to cite some).

At the same time, whenever such a concept becomes fashionable, it draws not only interest but also criticisms (Pluciennik 2011). These primarily revolve around its ontological vagueness and ambiguity; underestimation of social dynamics in driving change and transformation; conservative usage focused on the persistence of a 'system' (i.e. stability); and the insufficient attention it gives to politics and power relations (e.g., Beymer-Farris et al. 2012; Hatt 2013; Leach 2008; see Bollig 2014 for a general discussion). In certain instances, the notion of resilience is so deeply challenged that some have even proposed to discard its use entirely (e.g., Rashidian 2021). This theoretical debate has made the applicability of resilience narrow-viewed, as arguments are limited within each discipline's boundaries.

To overcome such critiques, some scholars have been recently advocating a transdisciplinary dialogue (e.g., Hamborg et al. 2020; Olsson et al. 2015; Persson et al. 2018; see Jackobs 2013: 76-80 for the differences between inter-disciplinarity, cross-disciplinarity, and transdisciplinarity). By recognising the inescapable vagueness of this type of abstract concept, one that Borghi et al. (2018) define as a social concept, these authors argue that research on resilience should not be confined within one's own discipline but instead include different disciplinary perspectives.

Following these studies, this volume reviews the current state of resilience studies and aims to provide new theoretical and methodological insights from an archaeological perspective. It proposes that the causal phenomenon behind conceptual vagueness and ambiguity, namely the dissociation of the concept of resilience, may help to understand the evolutionary history of the concept (i.e. when, why, and how the notion has shifted in meanings). Answering questions such as why and how many different perspectives exist and determining means to implement, or at least acknowledge, this diversity in

our research are all questions that should be answered. This is a crucial step for implementing a pluralist, transdisciplinary perspective—a research strategy in which different points of view are included.

Conceptual dissociation is broadly considered as the process through which social concepts, here defined as 'concept-systems', detach from their original meanings and develop alternate conceptualisations due to disciplinary fragmentation. In this sense, the 'resilience concept-system' encloses different acceptations—e.g., resilience as a property, process, strategy, or outcome—which focus on discipline-specific contexts, have peculiar identikits, and are approached from various theoretical and methodological standpoints. As part of the same system, interrelation and interdependence of the different conceptualisations are important features: these may share some aspects, reject others, or present peculiar characteristics.

Analysing dissociation and its history neither aims at a systemic unification nor a discipline-specific discussion; instead, it serves to pinpoint the relations between those alternative conceptualisations—why and how dissociation occurred, and what are (not) the features in common—within the same concept-system. This is necessary to identify which disciplinary domains can be integrated. In fact, as we shall argue, some degree of integration rather than unification is possible.

Whether there is a potential for creating an integrated 'study of resilience(s)', and what the role of archaeology is within this context, are matters of discussion here. Archaeology, with its ontological propensity towards cross-disciplinarity (Nilsson Stutz 2018) and familiarity in analysing pre- and post-disturbance contexts, can play a crucial role in understanding the systemic complexity of resilience, together with other social sciences that transcends the boundaries between natural and human sciences.

2. At the root of conceptual ambiguity and interdisciplinarity

In the scholarly debate, the abstractness and vagueness of the concept of resilience have twofold implications that result in opposite interpretations on the subject. By virtue of being ontologically weak, the notion of resilience appeals to different domains, which in turn impose their own meaning causing confusion over the plethora of conceptualisations and their use (see Moser et

al. 2019). At the same time, this vague essence is seen as a factor that promotes interdisciplinarity, as conceptual adaptations favour the spread of the resilience perspective (Strunz 2012).

To explain interdisciplinarity, resilience has been conceptualised primarily as either a boundary object or a metaphor (Brand and Jax 2007 and Carpenter et al. 2001 respectively). Boundary objects are terms that facilitate communication across disciplinary borders due to their flexibility (adaptation to local needs) and rigidity (maintenance of general identity) (Star 1989; Star and Griesemer 1989). Metaphors describe words that are applied to objects, actions, or contexts to which they would not be literally applied (e.g., Kellert 2008).

Recently, Thorén (2014) has commented on these ontological categorising. In their view, resilience cannot be regarded either as a boundary object or as a metaphor: as for the former, there may be disciplines ignoring other conceptualisations, so that interdisciplinary communication is not enacted; while in the latter case, the notion, although being part of a metaphorical transfer, is not a true metaphor itself. Alternatively, by exploring its abstract nature, the author has categorised most—but not all—of the definitions of resilience into two main schemas. He distinguished a local resilience, or the ability of a system to return to a reference state, and a global resilience, the maintenance of some property during a disturbance. However, as Thorén himself points out (2014: 318), "[...] both local and global resilience are context-insensitive concepts in the sense that they are multiply realizable". This is because highly abstract concepts cannot be reduced to one single context. And therefore, partial interdisciplinary integrations rather than unification are possible.

Interestingly, in a theoretical work that sought to clarify conceptual vagueness and interdisciplinarity, Moore (2004) provides a synthesis between boundary objects, metaphors, and abstraction. To explain how ethnographic research and general theories can be bridged, Moore introduced the notion of 'concept-metaphors': 'domain terms' of complex nature (cf. boundary objects) and "metaphors that have no adequate referent" whose "exact meanings can never be specified in advance" (2004: 73). Their ambiguous nature, which makes them interdisciplinary, cannot be resolved; in turn, it serves as a space where "tension between pretentious universal claims and particular contexts and specifics" should be maintained (2004: 74) (cf. Thorén's abstrac-

tion). This idea of the concept-metaphor provides an alternative to existing thoughts within resilience studies.

Expanding on Moore's (2004) concept-metaphors, we propose that resilience might be better understood as a 'concept-system': a complex adaptive notion created with a particular meaning, which is then 'translated' into other domains due to knowledge 'fragmentation', via the phenomenon of 'dissociation'. The foundation lies in the evolutionary character of languages, hence words: these are developed within a linguistic system, and they may change, adapt, and evolve through time (Nowak and Komarova 2001; see Croft 2000 for a general discussion). Theoretically, an 'original' conceptualisation exists, but in practise it is rather difficult to trace its origin (Moore 2004). Over time, such terms may be translated into other domains or borrowed from other languages, in some cases 'dissociating' and assuming alternative meanings and generating ambiguity.

The identification of concept-systems and their dissociation allows us to address their ambiguity, evolutionary history, as well as their dynamic, fluid, and relational aspects in a more comprehensive manner. On one hand, concept-systems assimilates features from the notions of concept-metaphors, boundary objects, and metaphors. They are flexible, allowing communication between disciplines; link different domains through the use of metaphors; and present some degree of abstraction that is essential to make them mobile and, at the same time, applicable to specific contexts. On the other, they explain conceptual ambiguity, taken for granted in the other proposals, through an evolutionary lens. Concept-systems have an evolutionary history, made of changes and adaptations of meanings. They are objects of theory-building processes, which create different conceptualisations according to individual disciplinary needs. Because of this history, all constructs are part of the same conceptual system and, thus, are linked to each other. Therefore, exploring the individual history of the dissociation of a concept-system can shed light on how theory is built in one discipline, what is borrowed from and used within another one, and the journey it goes through, which are all essential ingredients to embrace a truly integrative perspective.

2.1. On dissociation

In psychological research, dissociation is commonly understood as the separation of normally related mental processes that results in the "disruption of identity characterized by two or more distinct personality states" (APA 2013: 292). Alternative personality states (or 'alters') coexist within the same body and present some characteristics: they have their own identities; a characteristic self-representation; their own senses of autobiographical memory; and a sense of ownership of their own experiences, actions, and thoughts (Kluft 1991). Due to the complexity resulting from dissociation, alters require the development of an internal system, an 'inner world' in which they may interact and create their inter-relations (be they positive, neutral, or negative) (Kluft 2006).

Earlier in his formulation of the theory of dissociation, Cardena (1994) distinguished this phenomenon in three ways: as a lack of integration of mental modules or systems (or 'compartmentalisation'), as an altered state of consciousness (or 'detachment'), and as a defence mechanism to traumas (Spitzer et al. 2006). In other words, people affected by a dissociative disorder experience a fragmentation of their mental processes (e.g., memory) and identity, generally after undergoing traumatic events (Butler et al. 2019; Nijenhuis et al. 2010: 11).

When dealing with the disciplinary world, the theories built on concept-systems seem to generate a common feeling of confusion, misunderstanding, or misapplication due to the borrowing (or translation) of vague notions between disciplines. Due to this translation, disciplines re-elaborate conceptualisations originated in other fields according to local needs. We define this re-elaboration as dissociation, which can be interpreted as a defence mechanism, an adaptive strategy whereby each discipline creates an alternative construct that has a distinctive identikit (e.g., definition, field of application, methods). This construct may or may not share some aspects with the borrowed notion and has a positive, neutral, or negative relation to it. A positive bond is considered as adaptive, and it occurs when one discipline borrows almost the entirety of the conceptualisation developed in another one. A neutral relation may be seen as supplementary, as in the case of two disciplines using the same lens to treat a concept-system but focusing on two distinct

aspects. Instead, a negative link is established when perspectives are divergent and contradicting each other.

In these dissociative processes, compartmentalisation and detachment can be identified as emerging features. The former is expressed by the existence of several disciplines, considered as fragments, or compartments, of the broader research agenda (see Martin 1992). The latter occurs when the translation into other domains is completed, and new conceptualisations are created—a process similar to what Taylor and Vickers (2017) have recently labelled as 'conceptual fragmentation'. With this in mind, it is conceptual dissociation that allows, due to disciplinary fragmentation via detachment, ambiguity and thus cross-disciplinary mobility.

Given this complexity, how should scholars deal with dissociated concept-systems? How can we avoid the enduring trench warfare between disciplines and speed the process of knowledge advancement? As recently tested by Bialetti and colleagues (2015), disciplinary fragmentation hampers scientific progress, mostly in disciplines that are not influenced by ground truth, i.e. humanities and social sciences. To overcome such a quagmire, the authors suggest that it would be more beneficial to expose "researchers to influence from others with different views and approaches" (Bialetti et al. 2015: 23). In other words, a transdisciplinary approach could foster knowledge advances, particularly if maintained as a continuous feedback loop rather than a single instance of cross-disciplinary reflection.

3. The integrated yet dissociated status of resilience studies

The phenomenon of conceptual dissociation can be illustrated by exploring the history of the resilience concept-system. Since the 1970s, the notion has undergone a lively journey within the scholarly literature, moving towards and interacting with different disciplinary domains. This mobility has caused its meaning to adapt and change, eventually culminating in the emergence of several different theoretical stances. These theories, narrowly tailored to each disciplinary need, have made the world of resilience a rather "turbulent" one (Moser et al. 2019), susceptible over time to more and more criticisms (e.g., Garrett 2016; Olsson et al. 2015; Tarter and Vanyukov 1999).

Alexander (2013) has delineated the evolutionary history of the concept,

tracing its use within literature and legal works back to Roman times. It is only in the 17th century that, with the development of the inductive scientific method, resilience is first attested in a scientific context, namely as the rebounding property of echoes (see Bacon and Rawley 1670: 57, paragraph 245). The identification of resilience as a property to explain scientific phenomena is encountered again in engineering and mechanics when Rankine (1867) employed it to describe the strength (ability to resist an external force) and ductility (capacity to absorb the stress) of steel beams. It is this conceptualisation that influenced the use of resilience beyond engineering and physics. As Alexander (2013: 2710) notes, in fact, "[B]y analogy, the strength of a human society under stress is its ability to devise means of resisting disaster and maintaining its integrity (coherence), while the ductility lies in its ability to adapt to circumstances produced by the calamity in order to lessen their impact". Therefore, persistence and adaptation became human capacities useful to describe post-stress situations.

In current studies, one may distinguish two main 'strains' that have sourced their foundational assumptions from those earlier conceptualisations: one concerned with psychological, developmental studies, and one embedded in ecological, natural sciences (Berkes and Ross 2013). In most cases, psychological resilience tends to be considered as a process, outcome, or strategy (e.g., risk reduction), which hinges upon proactive rather than reactive responses, whilst ecological resilience is largely defined as a property of a given system, such as connectivity or adaptability, which might be analysed and measured (McGreavy 2016; Southwick et al. 2014).

In psychology, building upon Garmezy's research on children's robustness (1991; et al. 1984), Resilience Theory (RT) is understood as a process-driven framework in which promotive factors (i.e. assets and resources) help individuals overcome the negative effects of risk exposure (Fergus and Zimmerman 2005; Kulig et al. 2008; Zimmerman 2013). In ecology, RT, bound initially to ecosystems (Holling 1973), now focuses on the ability of a socio-ecological system (SES) to persist in the face of change (Gunderson and Holling 2002). In this context, the processes of transformation through which an SES undergoes due to disturbances are often explained with the Adaptive Cycle (AC) metaphor: a cyclic model in which the variables of resilience, 'connectedness', and 'potential' contribute to phases of systemic growth, conservation, release,

and reorganisation (Holling 2001). The AC can occur at different scales (e.g., organism, species, and population levels), which are all connected, and can thus be influenced if disturbances occur at any single scale. This concept, defined by Gunderson and Holling (2002) as 'panarchy', constitutes—alongside the SES—the second main theoretical pillar of ecological RT.

The psychological and ecological domains have been the main theoretical and methodological sources for interdisciplinary borrowing. Disciplinary shifts have not always been straightforward: they are often accompanied by reflections on the compatibility of such theories within the new field and their consequent conceptual adaptations—a process defined as 'translation' (Friedmann 2008). For example, when RT entered sociology via psychology as a framework to investigate communities' responses to disasters (Tobin 1999), scholars had to reconcile the psychological focus on the individual with various levels (familial, community, societal) of social scales (Kolar 2011). This problem of scale was addressed through human ecological theory—where individuals are reciprocally interacting with and influencing their environment—to enact a multi-level, relational approach (Condly 2006). Individuals were perceived as related to other individuals within their family, organisations, community, as well as to their environment (Keck and Sakdapolrak 2013). However, once this ecological domain was imported, an additional issue surfaced regarding the external environment, which steadily gained an active role in determining systemic social functioning. This posed a problem, one of exploring the concept/practice of resilience without falling into deterministic and re-naturalised perspectives of society (Cannon and Müller-Mahn 2010). To avoid this pitfall and thus to 'socialise' resilience, researchers have started emphasising aspects of agency and capacity as well as the risks associated with social phenomena, such as poverty (Brown 2014; Brown and Westaway 2011; Coulthard 2011; Estêvão et al. 2017).

To smooth the translation of RT from ecology or psychology to other disciplines, a preliminary integration occurred by using 'metaphors', and in particular by coupling the social and ecological domains (e.g., Adger 2000; Berkes and Folke 1998; Berkes et al. 2003; cf. Barrios 2016; Cote and Nightingale 2012). As the new analytical unit, the coupled SES opened up possibilities of exploring underlying processes that otherwise would not have been evident in discipline-specific research (Liu et al. 2007). This has made SESs a widespread

concept in the literature, from sustainability science to disaster risk reduction, to climate change adaptation, to linguistics or archaeology (e.g., Dunn et al. 2020; Fedele et al. 2019; Gain et al. 2020; Haimes 2009; Hudson 2019; Redman and Kinzing 2003; Sterk et al. 2017). It is important to emphasise that across disciplines, the foundation of the concept of 'systems' seems to facilitate the mobility of RT. As cohesive groups of interrelated and interdependent elements (von Bertalanffy 1975: 159), biological, social, natural, cultural, or technological systems are the analytical target of resilience studies; for this reason, "[R]esilience is a systems concept" (Berkes and Ross 2013: 14).

With the spread of the resilience perspective and the socio-ecological systems metaphor to other domains, in particular to social sciences, more contradictions have emerged. Currently, these mainly concern the role of resilience studies 1) to manage uncertainty and complexity—in contrast to the original ecological conceptualisation; 2) to deal with it proactively; and 3) to embrace transformative change in a particular direction (e.g., Brown 2014; Coaffee and Clarke 2015; Wilkinson 2012). For example, in the psychological sense, resilience is a process that can increase understanding in how individuals proactively build resilience and not how they simply react to adversities (see Masten 2001). This is different from the ecological view, where resilience is mainly investigated in terms of collapse or by describing the negative impacts that stressors have on the system.

All these issues link to the current 'descriptive-normative' debate around resilience (Moser et al. 2019; see Thorén and Olsson 2018). Within engineering and ecological studies, resilience is considered primarily as an analytical and descriptive notion, neither positive nor negative, which can be measured (e.g., Holling 1973). Its translation to social sciences, however, has made it a more normative concept: a goal to reach, a management approach to implement, or even a way of thinking for a positive outcome (see Meerow et al. 2016 for urban resilience, or Morecroft et al. 2012 for resilience and climate change studies). Although some have rejected this normative trajectory (Bahadur et al. 2013; Gillard 2016; Pizzo 2015), these two perspectives still persist in the current debate, making resilience studies far from a conciliatory research field.

The world of resilience is a complex one, filled with contradictions, paradoxes, adaptations, and different conceptualisations that have emerged during its lively journey across the disciplinary spectrum. While attempting theoret-

ical unification is deemed impossible and counter-productive (e.g., Olsson et al. 2015), aiming at partial integrations by acknowledging the existence of several 'resiliences' may represent a possible solution to bring order in this world. This can be done by exploring the vague and ambiguous essence of the concept and specifically by exploring its 'dissociative disorder'. In this way, it is possible to identify the type of relations (positive, neutral, or negative) between alternative conceptualisations. As we have seen, the translation of RT from ecology to sociology occurred due to the need to explore the human sphere, neglected by the ecological framework. However, this translation has led to a conflicted relationship between the two fields' research agendas, which eventually was smoothed—hence, it became neutral—by adopting the SES metaphor and by expanding the focus to social phenomena. Conversely, its translation from engineering to ecology can be considered a positive one, where despite theoretical adaptation (i.e. application of the notion to ecosystems instead of materials), the underlying capacities of a material or a system to persist and absorb perturbations were maintained.

Analysing the history of conceptual dissociation does not only shed light on the reasons why dissociation has (not) occurred but allows for the understanding of whether disciplinary integration is possible. In fact, having an overall knowledge of alternative conceptualisations and their use in different domains can prompt transdisciplinary research. This call for a pluralist perspective has gained more advocates within resilience studies in recent years, although few scholars have given clear inputs on how to enact such a point of view. Interestingly, more than a decade ago, Miller and colleagues (2008) proposed 'epistemological pluralism'—i.e. different ways of knowing things that can be construed as equally valid (see Healy 2003)—as a framework to value divergent perspectives and avoid discipline-dominated research. In their study, they purposely avoided providing a unique action plan for successful interdisciplinary research. Instead, they showed how research teams should negotiate discipline-specific needs in order to work towards a reorganisation of resources (intellectual, financial, administrative) that could result in a broader understanding of complex phenomena by considering the AC metaphor from both the urban ecological and the socio-ecological perspectives and by using it to explain knowledge production.

Members of the Swedish academia have reached a similar conclusion (e.g.,

Olsson et al. 2015; Persson et al. 2018). By analysing definitions of resilience beyond the ecological domain and from the perspective of social sciences, they now advocate pluralism. Incommensurability, namely the apparent conceptual differences and contradictions between natural and social sciences, and unificationist leanings (as attested, for instance, in ecology) are found to be major obstacles for interdisciplinarity. As they state, "[R]ather than seeing resilience as a grand or unifying theory, it should be seen (and used) as a middle-range theory compatible with some, but not all, ontologies" (Olsson et al. 2015: 9). It is pluralism, then, that can lead to an integrated yet not unified RT.

Based on energy and sustainability research, Hamborg and colleagues (2020) have proposed a cross-epistemic resilience framework that takes into account incompatible stances, considering diversity and pluralism as constructive factors for interdisciplinary research. By bringing together pre-existing concepts (the descriptive and normative lines of enquiry, the socio-eco-logical-technological systems, and the types of resilient behaviour—i.e. toleration, restoration, adaptation, transformation), the authors have built up a theoretical model that can guide scholars in defining more pluralist research questions and goals. Importantly, the proposition of an all-embracing framework should not be seen as an attempt to achieve unification; instead, this framework "should be understood as a set of terms and definitions that can guide discussions and be a starting point to develop more specific theories and models in different scientific disciplines" (Hamborg et al. 2020: 3).

Although different, these calls for a pluralist perspective share a few common points: 1) the resilience concept-system is a complex, flexible, and interdisciplinary notion; 2) the conceptualisations built on this concept are all linked by negotiating relations (positive, neutral, negative), even if they are discipline-situated; 3) the dissociation of concept-systems can help explain the phenomenon of interdisciplinary translation by addressing issues of conceptual diversity, fluidity, and identity; 4) while some degree of integration is possible through the use of metaphors (e.g., AC and/or SES), unification is not achievable due to disciplinary compartmentalisation. With these points in hand, it is still necessary to explore reslience's place within archaeology and how the field can embrace this pluralism.

4. The potential integrative role of archaeology for a 'study of resilience(s)'

Archaeology is a regular participant when it comes to the phenomenon of theory translation. As Schiffer stated (1988: 464), "[I]n most domains, some theories are derived from or are closely linked to theories in other disciplines and "[T]hese principles tend to be introduced by archaeologists borrowing new ideas to try". From Complex Systems theory to Middle-Range Theory, to Actor-Network Theory, to Gender Theory, to Evolutionary Theory, borrowed theories have always been at the core of the archaeological agenda.

The translation of RT into archaeology is due to the work of Charles Redman (2005; Redman and Kinzig 2003), who highlighted the potential of Holling's ecological resilience conceptualisation for archaeological research. In his studies, he particularly emphasised the role of the AC metaphor to explain past social-ecological and cultural changes and transformations.

Redman pointed out five key areas in which archaeology could enact a productive collaboration for resilience studies (Redman and Kinzig 2003): 1) the AC model can be fully explored in archaeology through analysis of pre- and post-stressor contexts; 2) long-term archaeological perspectives may help understand long-term resilience; 3) 'true transformations' (i.e. evolutions and revolutions) can be identified due to this longue durée approach; 4) the archaeological focus on multiple scales may help address the linked dynamics of an SES with human behaviours; 5) emergent features within complex systems may be distinguished to better understand adaptive strategies.

These insights have been embraced by many archaeologists, and mainly by those interested in long-term systemic resilience (e.g., Barton et al. 2018; Biagetti 2017; Gerrard and Petley 2013; Gronenborn 2006; Rosen and Rivera-Collazo 2012). As the archaeological conceptualisation of resilience is based on the ecological one, research has focused on the study of resilient systems in relation to their environment, with a particular focus on abrupt changes, such as collapse due to natural hazards (e.g., Faulseit 2016; Riede and Sheets 2020; see also Cumming and Peterson 2017). In these studies, the AC model has emerged as a key approach to understand human-environmental interactions (Bradtmöller et al. 2017).

However, some limitations that arise when translating resilience from the

ecological domain need to be highlighted. Redman and Kinzig already discussed them in their review, in which two theoretical flaws—or "paradoxes of resilience and adaptive capacity" (2003: 5)—were identified:

> One paradox of this concept is that a more resilient system implies more flexibility and hence less tight controls, but resilient systems are also defined as those able to maintain their controls and structure. An additional element of resilience theory is the recognition that systems and their contexts are continually changing, so resilience must also include a capacity for learning or restructuring new adaptations that often involve increased organizational complexity. This points to a second paradox, which is that resorting to increased social complexity to resolve problems seems to work in the short run while sometimes undermining the ability to solve them in the long term.

Both contractions hinge upon the distinction between engineering (short-term) and ecosystem (long-term) resilience, originally described by Holling (1996) and recently reframed by Faulseit (2016: 6–8) as political and cultural resilience. In the face of disruptive events, political leaders adopt short-term actions to preserve their control on society; conversely, social institutions tend to apply long-term, cultural strategies to adapt after political changes. Scholars face the challenge of reconciling these short/long-term scales, the flexibility-rigidity dichotomy, and the adaptive strategies deriving from these two forms of resilience. This implies that including power relations and social factors in the exploration of socio-ecological resilience, which cannot be excluded from the archaeological investigation of past resilience (Béné et al. 2012; Olsson et al. 2015), is crucial for a pluralist integrative approach.

Bridging short and long-term temporal scales and their related strategies is not the only challenge faced by archaeologists. As Peters and Zimmermann (2017: 43) explain, "[A] state has been reached now, however, where a merely metaphorical use of the concept will not take the issue any further. The next step in the application of RT in archaeology has to involve clearly defined parameters and measurable proxy variables". In other words, switching from 'conceptualising' the AC model to 'operationalizing' it. While in ecology

some attempts have been made (see, for instance, Castell and Schrenk 2020), in archaeology this task is rather difficult due to the fragmentary nature of archaeological data and the abstract character of the AC variables that explain resilience, i.e. connectedness and potential. Usually, these parameters are inferred from specific case studies and thus become biased from contextual and spatio-temporal coordinates, which are then forcibly fit into the AC general model. For instance, connectedness is identified according to the intensity of subsistence, mobility, or social organisation (Rosen and Rivera-Collazo, 2012). As a result, despite several attempts (e.g., Bicho et al. 2017; Dunning et al. 2012; Gjesfjeld and Brown 2020; Gronenborn et al. 2017; Marston 2015; Nelson et al. 2006, 2012; Sheets 2012; Weiberg 2012), agreement on how to assign those parameters is lacking. For this reason, in their general discussion, Bradtmöller et al. (2017) argue in favour of standardisation, both of terminologies and spatio-temporal resolution (through absolute dating), to move towards an operationalisation of the AC. However, if we recall the unificationist attempts made in the ecological and natural sciences, this proposal risks suspending knowledge advancement. The abstract, transdisciplinary notions of connectedness and potential may well be other concept-systems for which a theoretical unification is impossible.

The paradoxes described above are direct consequences of the widespread archaeological use of resilience as understood in ecology. Recalling the dissociative phenomenon of concept-systems, one can therefore say that there is a positive (adaptive) relation between socio-ecological and archaeological resilience, as both are centred on their systemic characterisation, descriptive mode of enquiry, and use of the AC metaphor to explain change. Conversely, a divergent relation exists within those normative studies (e.g., risk disaster management and policy-making) where resilience is interpreted as a strategy to prevent or minimise damages from future hazards. Whether archaeological studies can be used to identify strategies for the future is another limitation faced by archaeologists.

Archaeology may play a negotiating role among disciplines because, as highlighted by Redman and Kinzig (2003), both the past, the present, and the future can be scrutinised. In other terms, "the power of archaeological analysis of past disasters offers the possibility of explicating causal pathways from pre-existing conditions to whatever follows" (Riede and Sheets 2020: 4). In this

way, archaeology could help policymakers identify and focus on strategies that have proved successful in the past, which can then be used by social scientists to set future strategies.

Despite the opportunity to analyse the 'past future', archaeologists deal with a lack of complete datasets—in contrast to other social scientists who might have the data at hand but lack future contexts. Negotiation is therefore a key process to establish a transdisciplinary dialogue, in addition to moving beyond one's own disciplinary boundary as a necessary step (Miller et al. 2008). This negotiating potential has been recently explored in the edited volume by Riede and Sheets (2020), which focuses on past natural disasters and resilience. There, contributors have provided readers with a "summary for stakeholders", used to reach "a reading audience beyond our discipline" and to "encourage [us] to think of knowledge gained, how ideas can be put into practice, and policy implications, either very specific or very general in nature" (Riede and Sheets 2020: 7–8).

Despite these pitfalls, archaeological research on resilience provides an opportunity for a transdisciplinary dialogue. This is because it centres on cross-disciplinary notions, such as that of complex adaptive systems, which favour integration. As emphasised by Smith et al. (2012: 7620), "[M]odeling of complex adaptive systems is a second body of research in which archaeology plays a crucial role in integrating the social and natural sciences". Whether we deal with the past or the contemporary world, communities, languages, technologies, or cultures can be considered resilient systems that are continually changing, evolving, and adapting. In addition, computational and modelling techniques, increasingly used by archaeologists, may facilitate such a dialogue (Milner-Gulland 2012). In fact, the use of models to test complex systems allows reconstruction of human behaviour and power dynamics, thus guiding us beyond the mere material traces of the archaeological record (e.g., see Chrysanthi et al. 2012). However, this requires the discipline to not relegate the methods to a small field of specialists but embrace it wholeheartedly.

In conclusion, archaeology is well-equipped for the proposed reframing of resilience studies. From a theoretical perspective, the archaeological focus on complex systems can favour integration. Methodologically, computational and modelling techniques can help fill in the gaps between ecological and social resilience through the investigation of human agency. Despite some lim-

itations, these insights place archaeology in a privileged role of bridging these different epistemologies, ontologies, or methodologies of resilience.

5. The structure of the volume

With this volume of the Archaeological Review from Cambridge (ARC) dedicated to resilience, we aim to highlight the importance of computational and modelling techniques and acknowledge the diversity of approaches to understand past resilience(s). We understand resilience as a concept-system, a complex notion subjected to conceptual dissociation when translated to and adopted by different disciplinary domains. This makes resilience a dynamic, fluid, and relational concept, having both general theoretical traits and specific contextualised features. Understanding how the concept is positioned within each discipline and how different conceptualisations are related to each other is therefore essential for enacting interdisciplinary integration.

Overall, we believe it is necessary for archaeologists to embrace a pluralist perspective within resilience research. While the adherence to the ecological theoretical framework—with the use of the AC metaphors—is still important to describe adaptations and changes, further steps must be taken to integrate human decision-making processes. In this sense, due to the lack of the human component in the archaeological record, reconstructions through computing methodologies work to fill this gap.

The papers in this volume offer examples of how the human sphere can be included into resilience research, as well as how to approach it in a practical way, mainly through computational and modelling techniques, such as GIS and agent-based modelling (ABM) (Davies et al.; Kabora et al.; Scherjon) and interdisciplinary perspectives (Heitz et al.; Jørgensen), e.g. archaeoacoustics (Calabrese) and archaeolinguistics (Loktionov). In these contributions, the authors deal with specific conceptualisations within the resilience concept-system, from socio-ecological to urban, psychological, or linguistic resilience. This demonstrates the flexibility of this notion and the multitude of potentialities that exist to understand the past by acknowledging its diversity.

In the first paper, Scherjon considers resilience in its conservative ecological meaning of persistence and applies it to investigate the capacity of Western Eurasian Neanderthals to survive during the late Pleistocene. By developing

an agent-based model (ABM) (HomininSpace) to validate their dispersal into (sub)continental geographical areas and analysing different scenarios, the author tests several parameters drawn from the demographic, social, and subsistence domains that may have contributed to the disappearance or survival of those hominins.

Similarly, human occupation and mobility are the focus of Davies, Douglass, Fanning, and Holdaway's paper, where the authors examine the formation of a late Holocene surface archaeological record (stone artefact scatters) in terms of the movement and ecology of foraging populations in New South Wales. According to the simulations of an ABM, they argue that variation in density and cortical surface area of those scatters help reconstruct mobility changes, considered an adaptive mechanism.

The issue of spatial mobility is also tackled in the third paper. Heitz, Hinz, Laabs, and Hafner use temporally high-resolution data (pollen and pottery data) to explore how Neolithic communities in the Alpine region engaged with climatic challenges between 3500 and 3250 BCE. In a region where rising lake levels transformed lakeshores into submerged landscapes for decades at a time, thus destroying former settlement areas, frequent settlement relocations are considered as a resilience-driven capacity to cope with climate-induced environmental changes.

The effects of natural hazards on past communities are framed by Jørgensen in his methodological work inspired by critical disaster risk reduction studies. The author focuses on how urban entities might have been affected by such hazards and develops a model for ancient urban resilience. Taking into account the destructive force of earthquakes, the paper suggests which archaeological proxies may help to identify urban resilience.

The landscape and the resources therein play a crucial role in human decision-making processes. In their contribution, Kabora, Stump, and Wainwright explore a historical irrigated landscape in eastern Africa to demonstrate how communities characterised by high levels of social cohesion continued to farm despite knowing they could achieve equivalent yields from alternative activities. Through simulations of an ABM, it is shown that a sense of community and/or cultural identity can be a significant contributing factor in the resilience of socio-ecological systems.

Calabrese explored community-based social cohesion differently in her

interdisciplinary study of ritual ceremonies at Early Bronze Age Ebla. In this case, the death of ruling figures may cause disruptions of the functionalities of the society and jeopardise social order. Consequently, death-related rituals and group-affirming ceremonies, such as activities related to ancestor worship and kingship renewal, are interpreted as coping mechanisms to reinforce societal norms. In order to show the involvement of a broad audience in such ceremonies, the author explores the sensorial acoustic experiences of these rituals and their spread, necessary to strengthen social cohesion.

Finally, by focusing on the resilience of a key social construct in an ancient society, Loktionov's paper tracks the survival and evolution of a formative concept in Ancient Egyptian justice: 'hearing' (*sḏm*). By combining archaeological and philological perspectives, the author shows how this term was used over time and how it was adapted to changing socio-political realities, demonstrating how archaeolinguistics studies can provide further understanding of past societies' socio-political changes.

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