Resilience Conceptualised through Transformation: A Framework for Interdisciplinary Application

Joëlle Stocker

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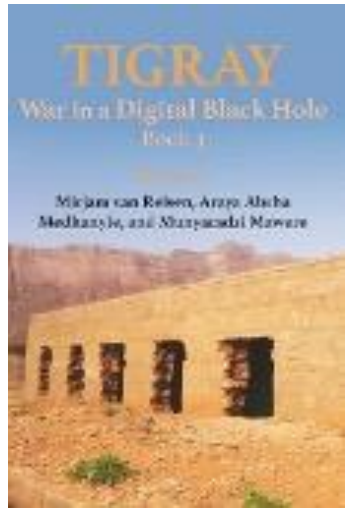

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Contents

Chapter 2

Resilience Conceptualised through Transformation: A Framework for Interdisciplinary Application

Joëlle Stocker

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That which you cannot bear will not be given to you.

Abstract

The research examines resilience as a 'travelling concept', focusing on two key aspects: spatial and interdisciplinary perspectives. It was found that resilience studies are largely Western-based, influencing how resilience is perceived. The measurement of resilience can be either economically reductionist (objective) or qualitative and participatory (subjective), with cultural differences affecting what contributes to resilience. Resilience is categorised into persistence, recovery, and adaptation/transformation, the latter involving either 'bouncing forward' or a complete systemic transformation. Resilience travels across disciplines, with 'adaptation' being a widely used construct, although its understanding varies by field. Psychology emphasises cultural context more than other disciplines. The findings suggest studying resilience on different scales, from narrow disciplinary views to broader cross-disciplinary perspectives, revealing its connections to other processes like cultural entropy and critical junctures. Resilience – with its twin concepts of hysteresis and panarchy – is a dynamic and evolving concept, changing as it moves across disciplines and cultures, leading to new interpretations and reflecting broader processes of adaptation, learning, and systemic transformation.

Keywords: resilience, literature review, hysteresis, resilience models, interdisciplinary research, cultural entropy, critical junctures

Resilience as a travelling concept

In 1969, the artist Sol Lewitt wrote *Sentences on Conceptual Art*. Therein he states that "the words of one artist to another may induce an idea chain, if they share the same concept", adding that "the artist may misperceive (understand it differently from the artist) a work of art but still be set off in his own chain of thought by that misconstrual". (LeWitt, 1969, cited in Alberro & Stimson, 1999, p. 107). In a similar way, the French philosopher Michel Foucault (1972) describes how concepts transform as they travel from user, field, and theoretical context, much like an artistic idea travels from artist to artist, thereby changing by virtue of the misconceptions brought forth by one's context:

> *There are the displacements and transformations of concepts: the analyses of G. Canguilhem may serve as models; they show that the history of a concept is not wholly and entirely that of its progressive refinement, its continuously increasing rationality, its abstraction gradient, but that of its various fields of constitution and validity, that of its successive rules of use, that of the many theoretical contexts in which it developed and matured.* (Foucault, 1972, p. 5)

In 2002, Mieke Bal coined the term 'travelling concepts', which describes how concepts, specifically in the humanities, can move through time, space, and discipline, thus evolving and changing (Bal, 2002). She explains how important it is to understand the mobility of concepts, to grasp the affiliations and legacies that are left behind by their development and uses. In the analysis of travelling concepts, she further identifies two distinct types of concepts: interdisciplinary and transdisciplinary. The first is when a concept has different meanings across disciplines, whereas with the latter the definitions stay the same throughout the disciplines.

In this chapter, we will be looking at resilience as a travelling concept. Resilience started emerging as a scientific concept in the 20th century, although whether this was in the early 20th century as an engineering term, or in the 1960s as an ecological term, depends on the perspective (Leys & Fossion, 2023). However, regardless of its origin, this concept has grown and expanded throughout a large number of disciplines to become an overarching concept with its definitions and

constructs becoming blurred. Especially in the past decade a lot has been published on how resilience should, and should not, be defined (Walker, 2020; Folke, 2016; Clark, 2021). For instance, there has been some debate on whether resilience is an inherent property of a system or person, or rather a process (Leys & Fossion, 2023). Another common point of focus is whether resilience is the ability to bounce-back from a disturbance to how it was before, or if it is about the ability to adapt and transform as a reaction to a disturbance (Walker, 2020).

Another issue in the field of resilience is the applicability of the concept in different contexts and cultures (Gaillard & Jigyasu, 2016). In general, it is not clear how accurate and reliable resilience measures are when frameworks are applied in the 'real world' (Saja *et al.*, 2019). This becomes even more problematic when looking at it from a global perspective, as resilience and its frameworks were developed in the West, creating a disparity when applying it to non-Western contexts. This is enhanced by the fact that, so far, most studies of resilience have been conducted in the Global North but particularly absent on the African continent (Xu & Marinova, 2013; Xue *et al.*, 2018; Yang *et al.*, 2021). Those that were conducted in Africa were carried out by non-African researchers (Xu & Marinova, 2013). Yet, it would be expected that the study of resilience is important in the African continent which is facing climate disasters, governance challenges, and social conflicts. However, it is not yet clear as to what extent the concept can be used and applied in a context that is so different from where it was developed. Similarly, in the context of the war in Tigray, it is not evident as to whether current frameworks for resilience are usable.

Some aspects of resilience as a travelling concept have been extensively documented. For instance, several studies have looked at how the concept of resilience has evolved through time and across disciplines (Alexander, 2013; Fraccascia *et al.*, 2018; Taşan-Kok *et al.*, 2013; Xue *et al.*, 2018). There are also several studies identifying the spatial distribution of resilience science (Xu & Marinova, 2013; Xue *et al.*, 2018; Yang *et al.*, 2021). However, one aspect of a travelling concept, and especially resilience, that has not yet been clearly

identified is how it travels across cultures. An important element of this is language; for a concept to be usable on a local scale it must first be translatable. Even then connotations might still differ. This has a significant impact on how resilience is defined and measured, especially if it is assessed by someone who is not familiar with the language and culture. How can resilience then be measured, if it is not even fully understood?

While the study of resilience has been extensive and there is certainly no lack of material, there is a need to review the concept and understand how its travel across time, space and disciplines, have influenced the way it is measured and contextualised. Furthermore, it is important to add the dimension of culture into the study of travelling concepts, to better understand how resilience has travelled through space and time. This study will answer the following question: *How can the understanding of "resilience" as a travelling concept enable new insights into the use of this term?*

This chapter aims to accomplish the following:

- Provide an overview of the various concepts under the umbrella of 'resilience', including how they relate between fields and definitions of resilience.
- Establish how resilience travels across cultures and what that means for the usability of the concept in different contexts.
- Explore how resilience is measured according to the various conceptualisations of resilience, including resilience models.
- Create linkages between concrete resilience models and social science theories.

Methodology

This study was conducted as a review on the literature on resilience. The literature used in this review was acquired through Google Scholar. Several search words were used.[1] As the literature on

[1] The search words used for the review were the following: "resilience", "cultural entropy", "critical transitions", "catastrophic shifts", "qualitative vs quantitative analysis", "measuring resilience", "critical junctures", "resilience studies geographic distribution", "resilience across cultures", "resilience Tigray", "social transformation".

resilience is so vast, it was not possible to do a systematic review of all relevant articles. In addition, snowballing was used to fill any gaps in the literature found thus far. The articles which were the basis for snowballing were those of Leys and Fossion (2021), Saja *et al.* (2019), and Capoccia (2016). Aside from reviewing the literature, some input for this article came from the research network GAIC (Globalization, Accessibility, Innovation and Care), which is affiliated with Tilburg University. This network consists of an international and diverse group of researchers, in which an extensive reflection on the conceptualisations of resilience in different cultures took place. The discussion consisted of input from the researchers on how resilience was expressed in their native language and used in research in their countries. The GAIC research network was further used to pick several relevant sociological theories and frameworks related to conceptualisations of resilience.

Finally, a systematic review was conducted of review articles on resilience published since 2019, using the search word 'resilience', which had to be in the title of the articles. This resulted in 3,040 articles. To further narrow the search and select the most relevant publications on resilience, articles that had more than 100 citations (according to Google Scholar) were selected. This resulted in 97 articles. A further selection was made based on relevance, specifically on whether the article was indeed a review article and on whether it identified constructs of resilience. Two more of the remaining articles were removed due to access restrictions. The final number of studies included in the review was 45. The systematic review of the resulting articles looked mainly at two factors: the geographic distribution of the publications and the constructs that are found across disciplines.

Definitions and development of resilience as a travelling concept

Different conceptualisations of resilience

Resilience is defined in various ways depending on the discipline and interpretation of researchers therein. Based on the literature three main categories were identified in which definitions of resilience can be grouped. The first is robustness, buffering capacity and the ability

to absorb changes. In other words, it is the perseverance of the same state for a system, where a system can remain unchanged after a disturbance. Berkes *et al.* (2020) describe it as:

> *…a measure of robustness and buffering capacity of the system to changing conditions.* (Berkes et al., 2020, p.12)

The second is the ability of a system to recover and bounce back from a disturbance reverting to the state of the system was prior to the disturbance. An example thereof is:

> *…'the ability of a substance or object to spring back into shape' or 'the capacity to recover quickly from difficulties; toughness'.* (Robertson & Cooper, 2013, p.1)

The final category is that of adaptation and transformation, whereby the system adapts and transforms after a disturbance to be able to cope with it better. This is described by Walker (2020) as follows:

> *Resilience is in fact the ability to adapt and change, to reorganize, while coping with disturbance. It is all about changing in order not to be changed. A resilient system responds to a disturbance by changing the relative amounts of its different parts and how they interact, thereby changing the way it functions.* (Walker, 2020, n.p.)

These categories were also identified by Folke (2006), shown in Table 2.1, where the first category was framed as the narrower interpretation and the final one encompassed the broader social-ecological context.

While these categories are useful to understand why the concept of resilience is used in such different ways, it is a simplification of how resilience is defined in the literature. It would be more useful to interpret them as the extremes of a continuum (or a three-dimensional graph), with all the possibilities in between. Many definitions are a combination of categories, sometimes focusing on one, while others find themselves in the middle of all categories. An example of the latter is the following definition by Bruneau (2003):

> *The ability of social units (e.g., organizations, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future earthquakes.* (Bruneau, 2003, p. 735)

Table 2.1. Overview of resilience concepts

Resilience concept	Characteristics	Focus on	Context
Engineering resilience	Return time, efficiency	Recovery, constancy	Vicinity of a stable equilibrium
Ecological/ecosystem resilience social resilience	Buffer capacity, withstand shock, maintain function	Persistence, robustness	Multiple equilibria, stability landscapes
Social-ecological resilience	Interplay disturbance and reorganisation, sustaining and developing	Adaptive capacity transformability, learning, innovation	Integrated system feedback, cross-scale dynamic interactions

Source: Based on Folke (2006)

This definition consists of the following important elements: mitigation, containing effects of disasters, and recovery. Both mitigation and containing the effects of disasters fit best within the first category, whereas recovery fits in the second. Moreover, recovery is not framed as bouncing back to the way it was before, but rather adapting so that the system is better equipped to face future disturbances. Another example is Keck and Sakdapolrak's (2013) three dimensions of social resilience: (1) coping capacity – how well individuals can deal with adversity, (2) adaptive capacity – being able to learn from past experiences and adapt for the future, and (3) transformative capacity – the ability to create change on an individual and institutional level. In all of these examples, recovery is directly linked to adaptation, where it is not about bouncing back to the way it was before but "bouncing forward" to a more resilient state (Hynes *et al.*, 2020). Keck and Sakdapolrak (2013) then add an important

aspect: transformation. This is an important part of resilience, although it is the least commonly discussed. Whereas adaptation, recovery and persistence or robustness are all common throughout disciplines, transformation is scarcer (Biddle *et al.*, 2020). Consequently, transformation is not understood as a vital part of resilience. Yet, as we will see in this chapter, it is an unavoidable part of the resilience narrative of systems, institutions and individuals.

Resilience across space and disciplines

As mentioned earlier, there is an abundance of literature describing how the concept of resilience has evolved over time, moved through disciplines, and travelled through space. Resilience is often perceived to have been introduced in the academic literature from the environmental sciences, with one of the early definitions by Odum (1969) and Holling (1973), in which adaptation is followed by transformation when the former is no longer possible due to climatic stress. From there, the concept quickly spread to psychology, introduced by Emmy Werner in 1971, and psychiatry, as well as anthropology (Leys & Fossion, 2023). Although it became widespread in the 1970s, the concept was used scientifically for the first time in the 17th century (Alexander, 2013). Later, at the end of the 19th century, it was introduced to the field of engineering (mechanics) in relation to finding the breaking point of iron bars (Leys & Fossion, 2023). From there it spread to the social sciences in the 1940s and 1950s (Alexander, 2013). The conceptualisation of resilience in anthropology was similar to that of ecology, being centred around 'systems', subsequently moving to psychology, in which the mind is the system (Alexander, 2013).

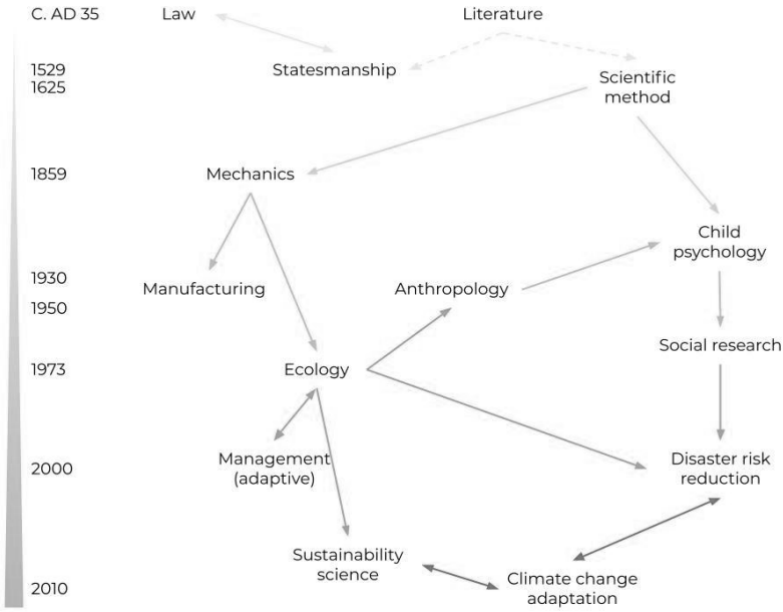


Figure 2.1. The introduction of resilience in various disciplines over time

Source: Adapted from Alexander (2013)

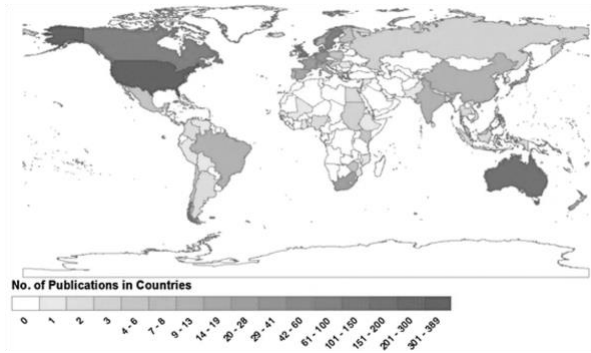
Xue *et al.* (2018) studied how resilience has changed spatially over time in the top 10 countries that published articles on resilience. This study found an interesting change between 1985 and 2014, when resilience literature transitioned from a more global distribution to mainly taking place in North America and Western Europe. Between 1985 and 1994 the list featured India, Israel, Japan, and South Africa, in comparison with the final decade (2005–2014), when the only non-Western countries featured were South-Africa and China. The absence of publications in different parts of the world is clearly visible in the map created by Xu and Marinova (2013), in which notably the African continent scarcely produced publications, compared to the rest of the world, and notably North America, (Western) Europe and Australia (Figure 2.2). This demonstrates an issue that is not often discussed, about how representative the measures for resilience are across spatial and cultural scales.

The geographic distribution of the review publications on resilience was also mapped, with Figure 2.3 showing the result. The countries

were selected based on author affiliations. If a publication had authors affiliated to institutions in different countries, the publication was counted for all those countries. The results are similar to those of Xu and Marinova (2013), Xue *et al.* (2018) and Yang *et al.* (2021), with the overwhelming majority of studies coming from the United States, Australia and Western Europe.

The issue of cultural context in the assessment of resilience is clear when looking at it from a psychological perspective. Leys and Fossion (2023) describe how during a collaboration with Cambodian researchers, they were told that in their culture symptoms of fatigue and sadness were considered normal and not related to depression. The danger of prescribing Western standards of wellbeing and resilience have been explored in a number of studies, though this is mostly limited to the field of psychology (DeVries, 1985; Ungar & Liedenberg, 2011; Gaillard & Jigyasu, 2016). For instance, Ungar (2008) discusses how it is difficult to know how much a particular aspect of resilience influences individuals, as they are not comparable across cultures. This can be defined as construct inequivalence, when people from different cultures are not able to comparably understand constructs, such as those related to resilience and resilience itself (Ungar, 2008).

A



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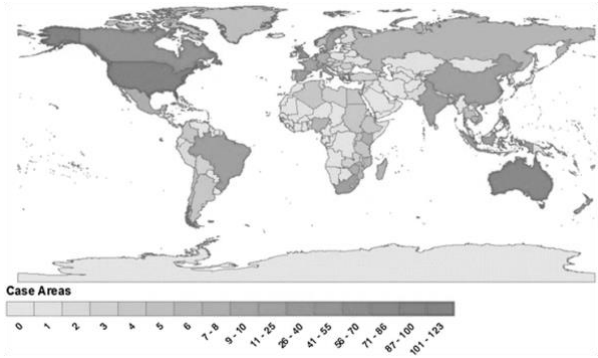

Figure 2.2. A: Number of publications on resilience by country; B: Number of case studies mentioned in resilience publications by country

Source: Xu & Marinova (2013)

When discussing resilience with the GAIC research network[2], it became clear that there is not one word that can fully encompass the entire concept, and a sentence would usually be needed to properly explain what is conveyed in different languages. For instance, in Dutch and Slovak the different aspects of resilience would be expressed through the words: 'veerkracht' (Dutch) and 'ohybnost' (Slovak) referring to bouncing-back, bendability, and flexibility;

[2] GAIC explores digital innovation, health, humanities, social sciences, and culture studies through inquiries into phenomena across diverse locations. It serves as a platform for intellectual exchange, mutual development, and offers essential research training in methodology and theory development for its PhD students.

‘elasticiteit’ (Dutch) and ‘elastickos’ (Slovak) meaning elasticity; and ‘weerstand’ (Dutch) and ‘odolnost’ (Slovak) translating to resistance and robustness. When asking several Luganda speakers in Uganda to translate resilience into their language, three different words were given: ‘obuvumu’ (to be able to withstand), ‘okulumerako’ (to persist) and ‘okuguma’ (to strengthen yourself). An interesting example was the translation to Amharic, ‘chay’, which was defined as the resistance to challenges or the resistance to change. Thus, directly going against the aspect of transformation within resilience. Similarly, in Tigrinya the word resilient translates to the terms ‘ፅኑዕ’ and ‘ፀዋር’, referring to coping or adaptive capacity, in which the sense of transformation and anticipation are missing. To refer to the aspect of transformation in resilience, the word ‘ሰጋር’ (‘segar’) is used.

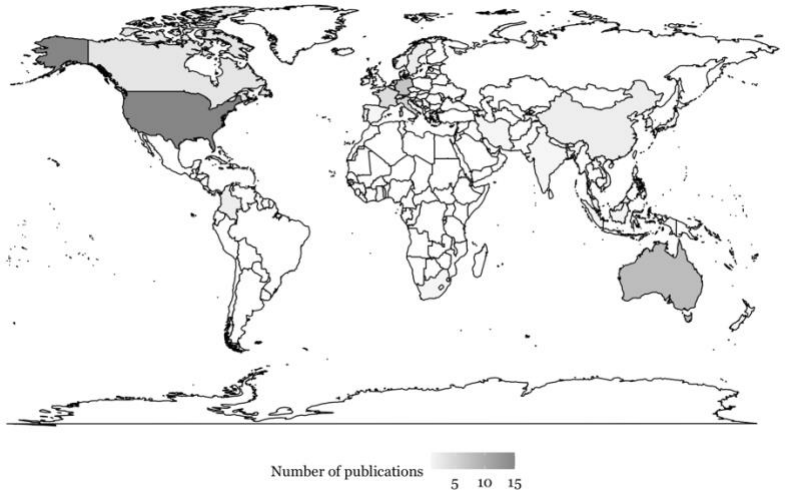

Figure 2.3. Geographic distribution of publications on resilience in the systematic literature review

Abundance of constructs linked to resilience

It is expected that the variety of ways in which resilience can be defined and understood leads to the abundant use of constructs, some of which are found across disciplines, adaptation being one of them, while others are specific to one. To showcase how extensive this is, we identified constructs from 45 review articles, in the fields of health science (1), medicine (1), sustainability (11), psychology (9), business/management sciences (8), environmental sciences (2),

engineering (6), Disaster mitigation sciences (4), economics (2), and data science (1). The 53 constructs most commonly mentioned in the literature (more than 3 times) are given in Table 2.2.

Table 2.2. Overview of constructs identified in the systematic literature review

Construct	Field	Source
Adaptation	Sustainability	Ribeiro & Gonçalves, 2019; Mahzarnia *et al.*, 2020; Ansah *et al.*, 2019; Roostaie *et al.*, 2019; Jufri *et al.*, 2019; Koliou *et al.*, 2020
	Psychology	Masten *et al.*, 2021; Cooper *et al.*, 2020; Stainton *et al.*, 2019; Ungar & Theron, 2020; Sisto *et al.*, 2019
	Health science	Haldane *et al.*, 2021
	Business/ management	Conz & Magnani, 2020; Hillmann & Guenther, 2021; Hosseini *et al.*, 2019; Negri *et al.*, 2021; Ntounis *et al.*, 2022; Golan *et al.*, 2020; Ali & Gölgeci, 2019
	Environmental sciences	McWethy *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019; McClymont *et al.*, 2020; Saja *et al.*, 2019; Tiernan *et al.*, 2019
	Engineering	Liu & Song, 2020; Singh *et al.*, 2019
	Data science	Linkov & Kott, 2019
Agility	Business/ management	Conz & Magnani, 2020; Hosseini *et al.*, 2019; Shekarian & Mellat Parast, 2021; Ali & Gölgeci, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019

Construct	Field	Source
	Engineering	Spieske & Birkel, 2021; Singh *et al.*, 2019
	Sustainability	Ali *et al.*, 2021
Anticipation	Business/ management	Hillmann & Guenther, 2021; Negri *et al.*, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
	Engineering	Liu & Song, 2020
	Sustainability	Roostaie *et al.*, 2019; Jufri *et al.*, 2019
Avoidance	Business/ management	Hillmann & Guenther, 2021; Negri *et al.*, 2021
	Disaster mitigation science	Tiernan *et al.*, 2019
Bounce back	Business/ management	Negri *et al.*, 2021
	Disaster mitigation science	McClymont *et al.*, 2020; Tiernan *et al.*, 2019
	Sustainability	Béné, 2020; Roostaie *et al.*, 2019
	Psychology	Ungar & Theron, 2020; Sisto *et al.*, 2019
	Engineering	Liu & Song, 2020
Buffering	Sustainability	Ribeiro & Gonçalves, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019; McClymont *et al.*, 2020
	Data science	Linkov & Kott, 2019

Construct	Field	Source
Capacity	Sustainability	Mahzarnia *et al.*, 2020
	Disaster mitigation science	Saja *et al.*, 2019
	Engineering	Sun *et al.*, 2020
Change	Sustainability	Ribeiro & Gonçalves, 2019; Elmqvist *et al.*, 2019
	Psychology	Cooper *et al.*, 2020
	Business/ management	Negri *et al.*, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
Collaboration	Business/ management	Hosseini *et al.*, 2019; Ali & Gölgeci, 2019
	Engineering	Spieske & Birkel, 2021; Singh *et al.*, 2019
	Sustainability	Ali *et al.*, 2021
Connected-ness	Sustainability	Ribeiro & Gonçalves, 2019
	Business/ management	Negri *et al.*, 2021
	Sustainability	Elmqvist *et al.*, 2019
	Disaster mitigation science	Saja *et al.*, 2019
	Environmental sciences	Nyström *et al.*, 2019
	Psychology	Laird *et al.*, 2019; Cooper *et al.*, 2020; Brooks *et al.*, 2020

Construct	Field	Source
	Engineering	Sun *et al.*, 2020
Control	Psychology	Cooper *et al.*, 2020
	Business/ management	Negri *et al.*, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
Coping	Medicine	Seiler & Jenewein, 2019
	Psychology	Masten *et al.*, 2021; Laird *et al.*, 2019; Brooks *et al.*, 2020
	Engineering	Liu & Song, 2020
Diversity	Sustainability	Ribeiro & Gonçalves, 2019; Elmqvist *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019
	Environmental sciences	Nyström *et al.*, 2019
	Engineering	Sun *et al.*, 2020
Dynamic	Business/ management	Ntounis *et al.*, 2022
	Psychology	Stainton *et al.*, 2019; Sisto *et al.*, 2019
	Engineering	Sun *et al.*, 2020
Efficiency	Sustainability	Ribeiro & Gonçalves, 2019; Elmqvist *et al.*, 2019; Ansah *et al.*, 2019; Jufri *et al.*, 2019
Equilibrium	Sustainability	Ribeiro & Gonçalves, 2019; Roostaie *et al.*, 2019

Construct	Field	Source
	Business/ management	Ntounis *et al.*, 2022
Exposure	Psychology	Ungar & Theron, 2020
	Disaster mitigation science	Tiernan *et al.*, 2019
	Sustainability	Jufri *et al.*, 2019
Faith	Psychology	Masten *et al.*, 2021; Cooper *et al.*, 2020; Prime *et al.*, 2020; Laird *et al.*, 2019
Flexibility	Medicine	Seiler & Jenewein, 2019
	Business/ management	Conz & Magnani, 2020; Hosseini *et al.*, 2019; Ali & Gölgeci, 2019
	Sustainability	Mahzarnia *et al.*, 2020; Ali *et al.*, 2021; Roostaie *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019
	Engineering	Singh *et al.*, 2019
	Economics	Ivanov & Dolgui, 2019
Functionality	Health science	Haldane *et al.*, 2021
	Business/ management	Hillmann & Guenther, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
	Sustainability	Jufri *et al.*, 2019; Koliou *et al.*, 2020
	Data science	Linkov & Kott, 2019

Construct	Field	Source
	Engineering	Sun *et al.*, 2020
Information sharing	Business/ management	Hosseini *et al.*, 2019; Ali & Gölgeci, 2019
	Engineering	Singh *et al.*, 2019
	Disaster mitigation science	Saja *et al.*, 2019
Learning	Business/ management	Hillmann & Guenther, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
	Sustainability	Roostaie *et al.*, 2019; Jufri *et al.*, 2019
Maintaining	Sustainability	Ribeiro & Gonçalves, 2019; Roostaie *et al.*, 2019
	Business/ management	Hillmann & Guenther, 2021; Negri *et al.*, 2021
	Disaster mitigation science	McClymont *et al.*, 2020
	Engineering	Liu & Song, 2020
Management	Psychology	Masten *et al.*, 2021
	Sustainability	Elmqvist *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020
	Data science	Linkov & Kott, 2019
Mitigation	Sustainability	Ribeiro & Gonçalves, 2019; Jufri *et al.*, 2019

Construct	Field	Source
	Business/ management	Negri *et al.*, 2021; Ali & Gölgeci, 2019
	Engineering	Zhou *et al.*, 2019; Sun *et al.*, 2020
	Disaster mitigation science	Saja *et al.*, 2019; Tiernan *et al.*, 2019
	Economics	Aldrighetti *et al.*, 2021; Ivanov & Dolgui, 2019
Optimism	Medicine	Seiler & Jenewein, 2019
	Psychology	Masten *et al.*, 2021; Cooper *et al.*, 2020
	Sustainability	Elmqvist *et al.*, 2019
Organisation	Psychology	Masten *et al.*, 2021; Prime *et al.*, 2020
	Sustainability	Elmqvist *et al.*, 2019; Roostaie *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019
Persistence	Business/ management	Conz & Magnani, 2020; Ntounis *et al.*, 2022
	Disaster mitigation science	McClymont *et al.*, 2020
	Sustainability	Roostaie *et al.*, 2019
Plan	Psychology	Masten *et al.*, 2021
	Business/ management	Golan *et al.*, 2020
	Data science	Linkov & Kott, 2019

Construct	Field	Source
Preparedness	Sustainability	Hussain *et al.*, 2019; Roostaie *et al.*, 2019; Jufri *et al.*, 2019
	Engineering	Bešinović, 2020; Zhou *et al.*, 2019; Liu & Song, 2020
	Disaster mitigation science	McClymont *et al.*, 2020; Saja *et al.*, 2019; Tiernan *et al.*, 2019
	Business/ management	Ali & Gölgeci, 2019
Prevention	Sustainability	Ribeiro & Gonçalves, 2019; Roostaie *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020
Recovery	Sustainability	Ribeiro & Gonçalves, 2019; Hussain *et al.*, 2019; Mahzarnia *et al.*, 2020; Roostaie *et al.*, 2019; Grafton *et al.*, 2019
	Business/ management	Hillmann & Guenther, 2021; Negri *et al.*, 2021; Golan *et al.*, 2020
	Engineering	Bešinović, 2020; Spieske & Birkel, 2021; Zhou *et al.*, 2019; Liu & Song, 2020; Sun *et al.*, 2020
	Disaster science	McClymont *et al.*, 2020; Tiernan *et al.*, 2019
	Economics	Aldrighetti *et al.*, 2021
	Data science	Linkov & Kott, 2019
	Psychology	Sisto *et al.*, 2019
Reduce impact	Business/ management	Negri *et al.*, 2021

Construct	Field	Source
	Engineering	Liu & Song, 2020
	Sustainability	Jufri *et al.*, 2019
Redundancy	Sustainability	Ribeiro & Gonçalves, 2019; Mahzarnia *et al.*, 2020; Elmqvist *et al.*, 2019; Ali *et al.*, 2021
	Business/ management	Conz & Magnani, 2020; Shekarian & Mellat Parast, 2021; Ali & Gölgeci, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019
	Engineering	Liu & Song, 2020; Singh *et al.*, 2019; Sun *et al.*, 2020
	Economics	Ivanov & Dolgui, 2019
Resistance	Sustainability	Ribeiro & Gonçalves, 2019; Roostaie *et al.*, 2019; Jufri *et al.*, 2019; Grafton *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020; Tiernan *et al.*, 2019
	Engineering	Liu & Song, 2020
	Business/ management	Ali & Gölgeci, 2019
Resourceful-ness	Sustainability	Ribeiro & Gonçalves, 2019; Mahzarnia *et al.*, 2020; Elmqvist *et al.*, 2019; Roostaie *et al.*, 2019; Ansah *et al.*, 2019
	Health science	Haldane *et al.*, 2021
	Business/ management	Conz & Magnani, 2020; Hillmann & Guenther, 2021; Ali & Gölgeci, 2019

Construct	Field	Source
	Disaster mitigation science	Cariolet *et al.*, 2019; Saja *et al.*, 2019
	Psychology	Ungar & Theron, 2020
	Engineering	Liu & Song, 2020
	Data science	Linkov & Kott, 2019
Response	Health science	Haldane *et al.*, 2021
	Business/ management	Conz & Magnani, 2020; Negri *et al.*, 2021
	Engineering	Bešinović, 2020; Spieske & Birkel, 2021; Zhou *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020
	Sustainability	Béné, 2020; Roostaie *et al.*, 2019
Restoration	Business/ management	Hosseini *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020
	Engineering	Liu & Song, 2020; Sun *et al.*, 2020
	Economics	Aldrighetti *et al.*, 2021
Risk	Engineering	Zhou *et al.*, 2019
	Psychology	Ungar & Theron, 2020
	Disaster mitigation science	Saja *et al.*, 2019
	Economics	Aldrighetti *et al.*, 2021

Construct	Field	Source
Robustness	Sustainability	Ribeiro & Gonçalves, 2019; Mahzarnia *et al.*, 2020; Grafton *et al.*, 2019
	Business/ management	Conz & Magnani, 2020; Negri *et al.*, 2021; Ali & Gölgeci, 2019
	Engineering	Bešinović, 2020; Zhou *et al.*, 2019; Liu & Song, 2020; Singh *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019; McClymont *et al.*, 2020
	Economics	Aldrighetti *et al.*, 2021
Scale	Sustainability	Elmqvist *et al.*, 2019; Roostaie *et al.*, 2019
	Data science	Linkov & Kott, 2019
Stability	Disaster mitigation science	Cariolet *et al.*, 2019; McClymont *et al.*, 2020
	Sustainability	Roostaie *et al.*, 2019
Stress	Medicine	Seiler & Jenewein, 2019
	Psychology	Cooper *et al.*, 2020; Ungar & Theron, 2020
Survivability	Business/ management	Conz & Magnani, 2020
	Engineering	Bešinović, 2020
	Disaster mitigation science	McClymont *et al.*, 2020
Tolerance	Psychology	Cooper *et al.*, 2020
	Sustainability	Mahzarnia *et al.*, 2020; Jufri *et al.*, 2019

Construct	Field	Source
	Disaster mitigation science	McClymont *et al.*, 2020
Transformation	Sustainability	Ribeiro & Gonçalves, 2019; Elmqvist *et al.*, 2019; Ansah *et al.*, 2019; Roostaie *et al.*, 2019
	Environmental sciences	McWethy *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020; Saja *et al.*, 2019
Transition	Sustainability	Elmqvist *et al.*, 2019; Roostaie *et al.*, 2019
	Business/ management	Ntounis *et al.*, 2022
Understanding	Health science	Haldane *et al.*, 2021
	Engineering	Spieske & Birkel, 2021
	Disaster mitigation science	Saja *et al.*, 2019
Variability	Sustainability	Ribeiro & Gonçalves, 2019
	Business/ management	Negri *et al.*, 2021
	Environmental sciences	Nyström *et al.*, 2019
	Economics	Ivanov & Dolgui, 2019
Velocity	Engineering	Spieske & Birkel, 2021; Singh *et al.*, 2019

Construct	Field	Source
	Business/ management	Ali & Gölgeci, 2019
Visibility	Business/ management	Hosseini *et al.*, 2019; Ali & Gölgeci, 2019
	Engineering	Spieske & Birkel, 2021; Singh *et al.*, 2019
Vulnerability	Health science	Haldane *et al.*, 2021
	Engineering	Bešinović, 2020; Zhou *et al.*, 2019
	Disaster mitigation science	Cariolet *et al.*, 2019; Tiernan *et al.*, 2019
	Sustainability	Jufri *et al.*, 2019
With-standing	Business/ management	Conz & Magnani, 2020; Negri *et al.*, 2021
	Sustainability	Hussain *et al.*, 2019; Ansah *et al.*, 2019; Roostaie *et al.*, 2019; Jufri *et al.*, 2019
	Disaster mitigation science	McClymont *et al.*, 2020
	Engineering	Liu & Song, 2020

What is striking is that many constructs have overlapping meanings. These include avoidance, preparedness, reduced impact, and mitigation; bounce back, recovery and restoration; anticipation and preparedness; and learning and adaptation. Similarly, in the review on urban resilience by Ribeiro & Gonçalves (2019), many constructs were found with similar characteristics and processes such as buffering and robustness; overlap in governance and redundancy; and social capital and resources. It is also interesting to look at constructs that are specific to particular fields. For instance, faith, optimism, stress, and coping were almost exclusively used in psychology,

whereas efficiency was only found in articles on sustainability. Many terms seem to be widespread in other disciplines, but not in psychology, such as risk, functionality, anticipation, restoration, preparedness, agility, response, withstanding, vulnerability, mitigation, robustness, diversity, redundancy, flexibility, resistance, and maintaining. This could indicate that resilience studies in psychology are more separated in terms of how the term is understood and defined compared to other fields, in which there is a bigger overlap.

Measuring resilience

The wide use of the constructs of resilience means that many frameworks and assessment methods have evolved by which it is measured. It is to be expected that the methods used in psychology are not the same as those used in environmental sciences. However, even within disciplines there are wide variances in the assessment methods used and, most significantly, in what exactly is being measured according to how resilience is defined.

Overview of methodologies used

As many as there are definitions of resilience, so there are ways by which it is measured. If we look back at the three ways in which we can categorise definitions of resilience – namely, the ability of a system to persist, the ability of a system to recover (quickly), and the ability of a system to adapt and transform – we already find very different ways of measuring resilience. For instance, with persistence a commonly used metric is redundancy, which identifies the connections between elements, focusing on those that could take over functions of others in the system (Hosseini *et al.*, 2019). Alternatively, a risk-assessment could be made, in which the probability that a disturbance would impact on the system is measured (Stochino *et al.*, 2019). The obvious way of measuring resilience in the context of bouncing back is by looking at recovery time (Pimm *et al.*, 2019). On the other hand, when looking at resilience through the lens of adaptation and transformation, Arani *et al.* (2021) suggest measuring it by using the 'life expectancy' or 'mean

exit time' of a system, which looks at the average time that a system spends in a particular state before transforming into a new one.

In general, however, it has often been found that approaches to measuring resilience do not assess it adequately (Ungar, 2003; Biddle *et al.*, 2020; Saja *et al.*, 2019). A mixed-method approach is better able to correctly and all-roundedness measure resilience and explore relevant constructs of resilience within a particular circumstance or context (Ungar, 2003). This allows the methods to complement each other. According to Biddle *et al.* (2020) who reviewed methods of assessing resilience in healthcare systems, qualitative and mixed methods are able to capture more dimensions of resilience than can quantitative analyses. Another way of overcoming this issue is by using specific resilience models. These are also extensive, but they at least provide a context within which measurements can take place (Ungar, 2003).

Biddle *et al.* (2020) provides two ways in which resilience can be quantified: the probability of failure and the consequences thereof. For instance, a standard measure in ecology is to look at the maximum perturbation a system can endure, although this paints an unrealistic picture of systems, which are subjected to almost constant shocks and fluctuations (Arani *et al.*, 2021). Furthermore, Biddle's (2020) distinction is only realistic if resilience is perceived as a process, rather than an inherent characteristic of a system. In case of the latter, the resilience of a system could be measured regardless of the presence of a disturbance, by identifying the specific characteristics that enhance the system's resilience.

Several studies that have classified how resilience is measured. For instance, Cutter (2016) went through assessments in disaster resilience and distributed the findings into three categories. These are indices, scorecards, and tools, with the first two being more abundant. Indices are quantitative analyses consisting of indicators of a specific characteristic of resilience, which are condensed together into one numeric value. Scorecards on the other hand measure the presence and absence of actions and items related to resilience. These tend to be based on qualitative assessments. Finally, the category of tools is a

combination of models and tools, such as toolkits, sample procedures and survey instruments.

Gaillard and Jigyasu (2016) also categorised measures of resilience to disasters into three groups: economic reductionism, anthropological particularism, and participatory pluralism, based on the methodologies used in poverty research by Chambers (2007). The first consists of quantitative assessments such as scorecards, ranks, and indexes. One of the most important weaknesses of such methods is the fact that they are contextually blind and based on generalised assumptions and definitions of the concept. Anthropological particularism, on the other hand, tends to be qualitative methodologies consisting of extensive descriptions in which the context is taken into consideration. Finally, participatory pluralism comprises participatory methods in which resilience is assessed by the people who are at risk themselves. Gaillard and Jigyasu (2016) point out an important limitation of qualitative research (anthropological particularism): such research is not so usable for policy and practice, and not easily reproducible, diminishing its usability in policy making. Qualitative research is, therefore, often limited to staying in academia and is not transferable to more practical dimensions.

Jones (2019) suggested that when looking at how we measure resilience, there are two things we must consider. The first is how resilience is defined, and the second is how resilience is evaluated. Both can then be analysed using a subjectivity-objectivity continuum. If we then look at the categories mentioned by Gaillard and Jigyasu (2016), economic reductionism would be placed in the quadrant where resilience is both defined and evaluated in an objective way. In other words, the researchers have a set idea of what resilience is and what elements characterise it. This has clear drawbacks when taking construct inequivalence into account. At the other end of the continuum, where resilience is defined and evaluated in a subjective way, lies the category of participatory pluralism in which both the interpretation of the concept and the identified characteristics are not fixed by the researchers, but are decided by participants themselves. This also gives a voice to communities that tend to be silenced in

knowledge production and, thus, creates a better understanding of the local perception of the concept of resilience (Ungar, 2003).

Looking specifically at studies on resilience that were conducted in Tigray, participatory and qualitative methodologies are already used, especially when looking at community resilience (Maxwell *et al.*, 2010; Forch, 2012; Ahmed, 2011, Ghebreyohannes *et al.*, 2022). On the other hand, when looking at livelihood resilience, more of an economic reductionist approach tends to be taken (Vaitla *et al.*, 2012; Tsehaye *et al.*, 2009). For instance, Vaitla *et al.* (2012) measures livelihood resilience using indicators with set quantitative frameworks developed in the literature, but that have not been adjusted for the Tigrayan context. They define resilience as:

> *the ability of an individual, a household, a community, or an institution to withstand a shock or setback of some type and recover, or 'bounce back,' after a setback. As such, it implies the ability to cope with adversity by adapting, learning, and innovating.* (Vaitla, et al., 2012, p. 3)

Thus, here, resilience is both defined and evaluated in an objective way. In contrast, Forch (2012) established a methodological framework within the community with the goal of creating an understanding of resilience within the Tigrayan context, which was subsequently tested and developed further. Yet, resilience is still defined in an objective way as the ability of a system to absorb change. Consequently, we can argue that while the assessment of resilience is defined objectively, the assessment thereof is subjective. Although the issue of language was mentioned in the latter, specifically mentioning that the translations were conducted to reflect what was being said, rather than editing it to fit in broader categories, the issue of language and translation was not reflected upon in terms of how the concepts were translated to, and understood by, the participants.

Resilience models

As an assessment tool, models are important to show relationships between different dimensions that define resilience. They visualise processes, while providing a mathematical dimension to the concept, thus facilitating measurement. The importance of models lies in the fact that rather than defining a concept, they depict a process that has

been observed and can be used separately from the concept. As such, the model can be applied in various scenarios, if the process itself is present and relevant.

One model of resilience used in a number of studies is one in which critical functionality is assessed as a measure of time (Ganin *et al.*, 2016), as depicted in Figure 2.4. This model encompasses the notion of resilience in which the three categories: persistence, recovery, and adaptation, are the stages of resilience to a disturbance. This is especially useful in fields such as disaster risk reduction, where the concept is centred on the reaction to a disturbance. Consequently, this model is a linear conceptualisation, in which the emphasis is on recovery, in the form of bouncing forward.

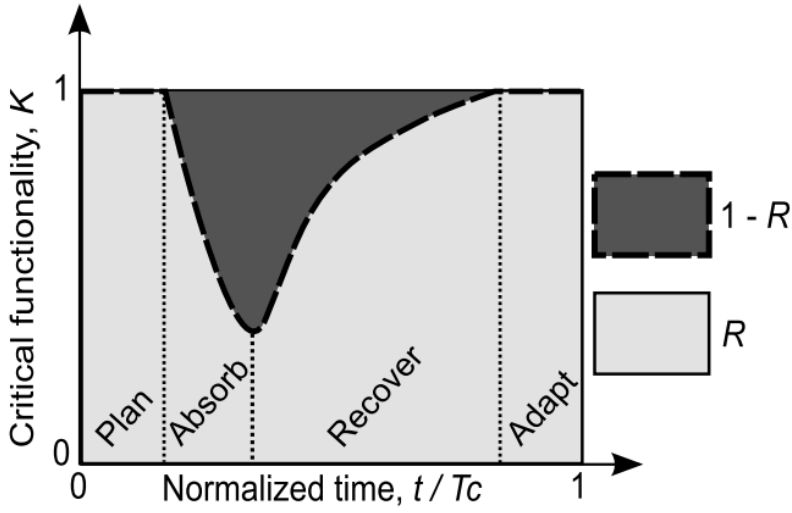

Figure 2.4. Critical functionality as a function of time

Source: Ganin *et al.* (2016)

A more circular model is that of the adaptive cycle, introduced by the Resilience Alliance (2010) in a workbook they created for assessing socio-ecological resilience. The cycle depicts the different stages that a socio-ecological system goes through, namely, rapid growth (r), conservation of resources (K), release of resources (Ω), and reorganisation (α) (Figure 2.5). These stages are somewhat similar to the ones in Ganin's model (Ganin, 2016), where the disturbance is

the release of resources and reorganisation is simultaneously recovery and adaptation. However, this model has some important aspects in the resilience narrative that have not been discussed so far, namely, the existence of different system scales that are connected hierarchically, where what happens on one scale affects events on other scales (Gunderson and Holling, 2004). The way in which several adaptive cycles on multiple scales are connected is called panarchy[3] (Resilience Alliance, 2010). Being aware of this cycle and scales is essential when introducing efficient management interventions, as the same intervention may have very different results according to where in the cycle it is introduced.

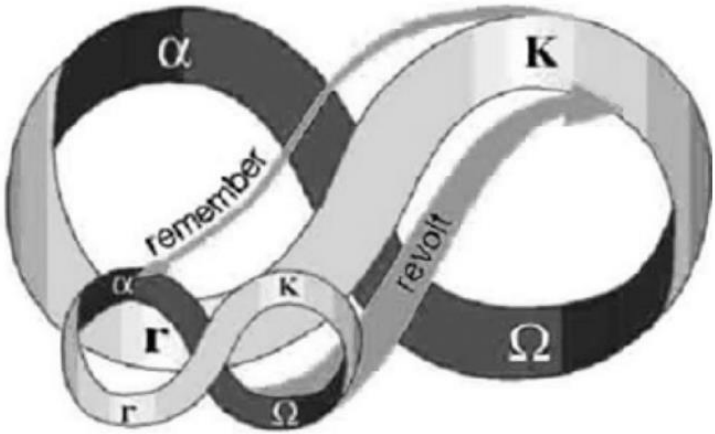

Figure 2.5. The adaptive cycle

Source: Resilience Alliance (2010)

The last model is widely used in environmental sciences. It looks at critical transitions or catastrophic shifts within ecosystems, focusing on the transformation of systems. A significant term for this is that of alternative regimes or system states, which a system can move to

[3] Defined by the Resilience Alliance ("Panarchy", n.d.) as: "No system can be understood or managed by focusing on it at a single scale. All systems (and SESs especially) exist and function at multiple scales of space, time and social organisation, and the interactions across scales are fundamentally important in determining the dynamics of the system at any particular focal scale. This interacting set of hierarchically structured scales has been termed a "panarchy" (Gunderson & Holling 2003)"

as a consequence of disturbances and low resilience. Figure 2.6, which is adapted from Scheffer *et al.* (2012), depicts this transition, with F2 being the tipping point or threshold. The S-curve of the graph indicates that this transition is difficult to reverse. Although it is possible to reach the tipping point, which will bring the system back to its previous state, it is not sufficient to bring the conditions of the system back to the way they were at the threshold. Rather, they must go back much further to reach the backward shift. This process, which is essentially the distance between F1 and F2, is called hysteresis[4].

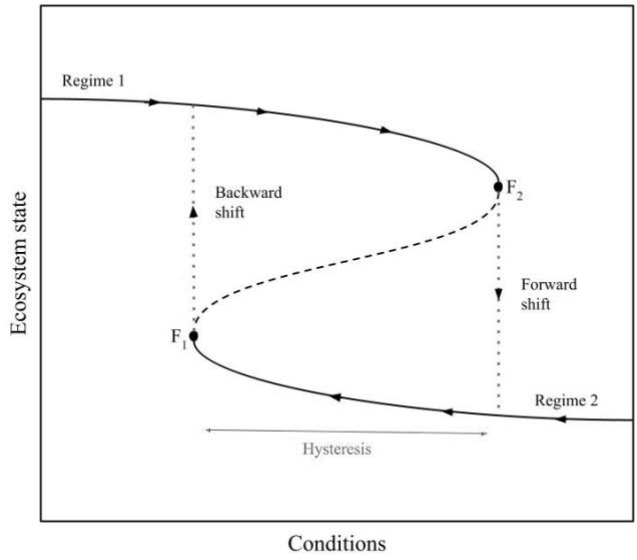

Figure 2.6. Visualisation of a critical transition

Source: adapted from Scheffer *et al.* (2012)

This model is also often linked to the ball-in-the-cup analogy, where the system is visualised by a ball that lies at the bottom of a basin. When a disturbance occurs, the ball (or system) is moved away from the bottom of the basin, with the magnitude of the disturbance

[4] Scheffer & Carpenter (2003) defined hysteresis as: "To induce a switch back to the original valley, it is not sufficient to restore the environmental conditions present before the collapse. Instead, one needs to go back beyond another bifurcation point (F1), where the system shifts back. The difference between forward and backward switches is known as hysteresis".

defining how much the ball is pushed. The steepness of the slopes of the basin are, therefore, imperative in how fast the ball will come back and stabilise at the bottom. It also means that the less steep the slope, the more easily a disturbance can move it from one basin to another, to an alternative system state. Figure 2.7 by Scheffer (2020) visualises how it is linked to the model of critical transitions, with the slope becoming less steep as the system moves towards the tipping point.

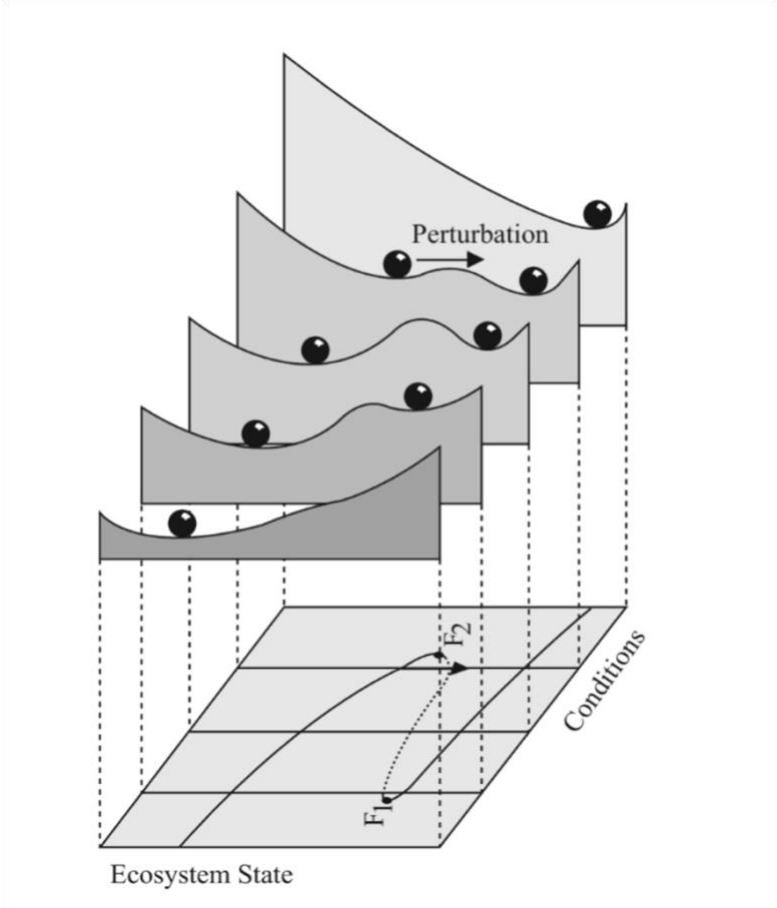

Figure 2.7. Critical transitions visualised together with the analogy of the ball-in-the-cup

Source: Scheffer (2020)

Another important element in the models of critical transitions is the feedback loop, which can be classified as positive or negative feedback loops (Palmer, 2022). Negative feedback loops are

stabilising reactions, meaning that an action will lead to a reaction which cancels out the effect of the reaction, i.e., homeostasis. A common example of this is a hot cup of coffee: it starts off very hot from which it cools down quickly. However, the more it cools down and thus the colder it gets, the more slowly it cools, until it reaches an equilibrium temperature. A positive feedback loop has the opposite effect, an action leads to a reaction that enhances the action leading to exponential growth. A clear example of this is the melting of the ice caps caused by warming. As the ice melts, the vegetation below the ice becomes visible, which absorbs more heat than the ice, leading to more warming. These feedback loops are important in critical transitions, with a negative feedback loop maintaining the status quo, in contrast to a positive feedback loop, which will result in a transition to a new regime.

Linking resilience models to sociological concepts and theories

Our understanding of resilience is related to the observations we make of the world, individuals and systems. It is based on processes from the past and present that have been identified and analysed. This is what science is about – creating knowledge that can help predict how things and entities behave, enabling better interventions, management and care of the world around us. Thus, processes that are attributed to one concept, are often not limited to that concept, instead being described in different ways in different contexts. This next and final part of the chapter looks at how we can identify the processes described in resilience science across various theories in the social sciences, specifically looking at cultural entropy, theories of Foucault, Kingdon's multiple streams approach, and critical junctures.

Cultural entropy

An important concept in the study of organisations is cultural entropy. This has already been discussed in connection with resilience (Normandin & Therrien, 2016; Comfort *et al.*, 2009; Comfort *et al.*, 2011; Golicic *et al.*, 2017). Cultural entropy is described as how much disorder a system contains, moving it away from an equilibrium state

(the attractor of the system) to a state of imbalance (Martínez-Berumen *et al.*, 2014). Thus, the higher the entropy, the further the system moves from the state of equilibrium. This can be easily visualised with the ball-in-the-cup, where the bottom of the basin is the equilibrium state, literally attracting the system towards it, and the level of entropy is reflected in how steep the slopes are. A steeper slope is related to low levels of entropy, whereas a less steep slope means that there is a high level of entropy. Normandin and Therrien (2016), for instance, discuss this through negentropy and entropy, representing order and stability and disorder and change, respectively. They compare them to negative and positive feedback loops, being forces of stabilisation and destabilisation.

Foucault

Michel Foucault spent a lot of time discussing knowledge and power. He introduced a new way of looking at power: rather than it being a top-down approach, he saw it as an inherent force acting from the bottom-up. In his works, Foucault often talks about transformation. As mentioned in the introduction, he discusses how concepts change through the various fields of validity, successions in their deployment and the theoretical contexts in which they evolve He also talks about transformation in individuals and institutions. For instance, he talks of theoretical transformation, which "establishes a science by detaching it from the ideology of its past and by revealing this past as ideological" (Foucault, 1972, p. 5). This is the transformation of knowledge: what we perceive as true or scientific can shift when a particular theory is introduced which changes our understanding of the world, leading to a new regime of knowledge and science. He describes this further as follows:

> *There are the epistemological acts and thresholds described by Bachelard: they suspend the continuous accumulation of knowledge, interrupt its slow development, and force it to enter a new time, [...] they direct historical analysis [...] towards the search for a new type of rationality and its various effects.* (Foucault, 1972, p. 4)

He also discusses transformation in the context of systemic change, similar to that of critical transitions:

> *The process which, through ceaseless struggles and confrontations, transforms, strengthens, or reverses them, as the support which these force relations find in one another, thus forming a chain or a system, or on the contrary, the disjunctions and contradictions which isolate them from one another.* (Foucault, 2004, pp. 92–a 93, translation by Jessop, 2017)

Here, Foucault discusses power, how it exerts its force on people and institutions, through force relations. He states that if these work together, and find their support with each other, they lead to transformation. Whereas if they work against each other, they are isolated from one another and cancel each other out. This can again be easily compared to feedback loops: negative loops cancel out the effects of individual actions and positive loops enhance these actions leading to transformation. Thus, it can also be linked to entropy, stability, instability, and, as such, resilience. Another important concept that he mentions is that of scales, where one must make distinctions at what scale an event takes place and how it affects the other scales, thus, describing panarchy:

> *There is the distinction, which we also owe to Canguilhem, between the microscopic and macroscopic scales of the history of the sciences, in which events and their consequences are not arranged in the same way: thus a discovery, the development of a method, the achievements, and the failures, of a particular scientist, do not have the same incidence, and cannot be described in the same way at both levels; on each of the two levels, a different history is being written.* (Foucault, 1972, p. 5)

Foucault argues that change on one scale directly and sometimes immediately impacts on (all) knowledge on another scale and transforms knowledge. It follows that resilience in the context of (any) knowledge creation is a dynamic, not static, concept that emerges from the mind in a social and cultural understanding of it. Resilience cannot be understood outside the realm of knowledge creation, as a process that is situational and time bound.

Kingdon's multiple streams approach

In his multiple-streams approach, Kingdon explains how policies and organisations change as a consequence of policy windows. He

describes three streams (Figure 2.8): the problem stream (identification of a policy problem), policies stream (finding a solution to the problem) and politics stream (motivation and opportunity to create a policy out of the solution) (Kingdon, 1984). Focusing events are described as circumstances that have the potential to open a policy window, with the situation before and after such an event being different.

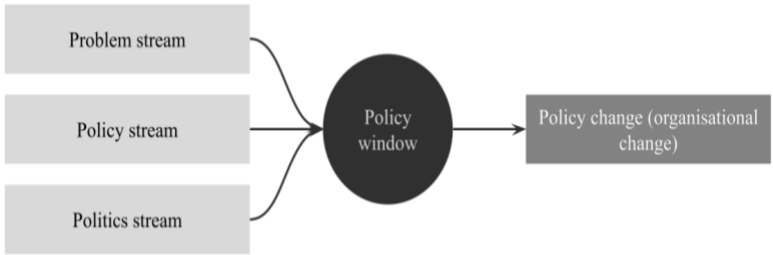

Figure 2.8. Kingdon's multiple-streams approach
Source: Adapted from Asmoredjo (2020)

There are several ways in which Kingdon's multiple-streams approach resembles the model of critical transitions. First, it is easy to compare the policy window with the threshold, leading to policy change and, thus, an alternative state. The streams are different scales at which disturbances can take place, influencing one another. For instance, Boin *et al.* (2020) describe how positive feedback loops occur within the multiple-streams approach, where an action or non-action in one stream can lead to a reaction in a second and third stream, which then affects the other two streams in return, ultimately leading to regime and policy changes.

The concept of hysteresis can also be found in the multiple-streams approach. Zahariadis and Exadaktylos (2016) investigated education reform in Greece at the beginning of the previous decade. In this study, they explained how in April of 2015 the reversal of some important reforms was proposed, with ultimately a return to the previous state. Yet, the reversal of these policies was not straightforward: "cosmetic changes are made but the core structure

remains the same until the environment changes to once again fit more closely to existing policy" (pp. 78–79).

Critical junctures

Critical junctures stem from the study of institutions, identifying processes of change within them. They are defined as a short period of time when political reorientation leads to the founding of new institutions, resulting in a set trajectory of change for nation states (Collier & Collier, 2002). Critical junctures can be both brief and long, for instance, choosing to go down one path or another, or an extended period of reorientation. It can be easily linked to Kindgon's policy windows, in which conditions lead to changes in policy, direction, or governance. An important aspect of critical junctures is that of legacies – it must be clear that the critical junctures connect to a clear hypothesis in relation to its consequences. If these do not match, meaning that the critical junctures do not generate that legacy, we cannot talk of a critical juncture (Collier & Collier, 2002).

An interesting aspect of critical junctures is that they do not necessarily always lead to change, but rather can lead to the re-equilibration of the institution (Capoccia & Kelemen, 2007). Thus, instead of being about the change itself, it is about the process and the legacy of a decision made regarding the future of the institution. Capoccia and Kelemen (2007) make a distinction between 'weak' and 'strong' institutions, with the former being more prone to "breakdown and replacement" during institutional change than the latter. Collier and Collier (2002) also discuss the importance of acknowledging what does not change with critical junctures, in which the new regime needs to be compared with the old regime and what did not transform.

Conclusion

The aim of this chapter was to shed light on how we use and conceptualise resilience to enhance understanding of how we choose to use it. There are two important aspects of resilience that need to be discussed when looking at it through the lens of a travelling concept. The first focuses on the aspect of space, an obvious part of which is the geographic distribution of resilience studies, being

overwhelmingly Western, thus influencing the perspective through which resilience is viewed. Another significant element to acknowledge is how resilience is measured. Adopting the framework of Chambers (2007) or Jones (2019), it is important to consider whether the concept of resilience is being assessed in an overwhelmingly economic reductionist (i.e., objective) or qualitative and participatory (i.e., subjective) manner.

As has been found several times within the field that what we expect to be resilient and what we expect to help with resilience does not translate equally between cultures and situations. This perhaps explains the three categories in which resilience can be defined: persistence, recovery, and adaptation/transformation. The latter is especially interesting, with a distinction to be made between adaptation in the sense of bouncing forward and a complete transformation of the system with the emergence of an alternative regime. Although transformation is less present in the literature on resilience, it emerges clearly when looking at social science theories, thus distinctly acknowledging this resilience transformation process by different scholars with diverging perceptions.

The second important aspect in looking at resilience as a travelling concept is to analyse how it travels across disciplines. A measure of this is how resilience is defined and the constructs that are used in relation to it. For instance, the construct of adaptation is the most widely used one, indicating that this part of resilience is most widespread. As is clear from the distribution of constructs across fields, there is less overlap in how resilience is understood in psychology, in contrast to all other disciplines which were included in the analysis. This may also be the reason why the importance of cultural context in resilience is much better discussed in the field of psychology, in comparison to other disciplines.

Studying the concept of resilience can be done at various scales. A narrow scale may focus on disciplines or even streams within disciplines. A slightly broader perspective would be looking at resilience across disciplines. At the broadest scale, resilience may be removed from the box of 'resilience', by incorporating theories that are related to but not defined as resilience. This chapter focused

mainly on the latter two, since the concept of resilience within disciplines has been extensively discussed. Across disciplines there is also a vast abundance of literature, however, there are fewer studies identifying how the concept of resilience is linked to processes described outside the field of resilience studies. The importance of this is that the essence of resilience is not on the concept itself, but the process that the concept describes. The conceptualisation of resilience merely helps to create a concrete framework around this process. Although as we have seen, when it comes to resilience, this framework is often not so concrete. It is useful, therefore, to compare resilience to other well-defined processes, allowing a more tangible use and understanding of resilience itself. For instance, the theories of cultural entropy and critical junctures may help in using resilience in the context of institutions, looking at feedback loops, alternative regimes and whether change is necessary within that framework.

The creation of knowledge is messy, especially when considering the multiple perspectives in which knowledge is assembled and through which it travels. While talking about art, Lewitt perhaps unknowingly describes a process that has been the essence of knowledge production: the borrowing of ideas, leading to their constant development, at the heart of which lies misperception and misconstrual. When discussing resilience as a travelling concept, one process takes centre-stage: transformation. As has been shown in this chapter, the term itself has evolved and transformed into not one, but several, perceptions of itself. It is a dynamic concept that keeps taking on new forms and identities, as it is used and passed on from discipline to discipline and scholar to scholar. In the same way, it transforms with the different languages used, as we apply it in contexts far from its birthplace, often failing to understand the infinite nuances in translation and understanding. Finally, it describes transformation, through the adaptation and learning that individuals, systems, and institutions undergo, as well as through the catastrophic transition that takes place when systems fall from one state to another, in the same way that Foucault describes the decisive regime changes that take place with the creation of knowledge.

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Author's contributions

Joëlle Stocker is a PhD student at Wageningen University and works as a researcher at Europe External Programme with Africa. She also is a fellow of the Research network Globalisation, Accessibility, Innovation and Care (GAIC). She is solely responsible for this chapter, and conceptualised the research, the methodology and wrote all versions of the chapter.

Ethical clearance

There was no ethical clearance required for this research.

This chapter should be read in conjunction with the 'Note on Content and Editorial Decisions'.

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