ORIGINAL RESEARCH

Taking the Russo-Williamson thesis seriously in the social sciences

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Abstract
The Russo Williamson thesis (RWT) states that a causal claim can be established only if it can be established that there is a difference-making relationship between the cause and the effect, and that there is a mechanism linking the cause and the effect that is responsible for such a difference-making relationship (Russo & Williamson, 2007). The applicability of Russo and Williamson's idea was hugely debated in relation to biomedical research, and recently it has been applied to the social sciences (Shan & Williamson, 2021). While many philosophers and social scientists have advocated the use of different kinds of evidence for causal discoveries, others have criticised this approach. With this paper, I aim to defend RWT from criticisms and to show its importance in the social sciences. The paper is structured as follows. After a brief introduction, in Sect. 2, I will summarise RWT, and in Sect. 3 I will describe how this approach can be applied to the social sciences. In Sect. 4, I will reconstruct two main criticisms of this thesis proposed in the philosophy of the social sciences literature: namely (i) RWT is not used in the social sciences, (ii) RWT does not work. For each criticism I will provide a defence of RWT. My defence will be based on two general considerations: (i) RWT appears perfectly in line with the research methods used in the social sciences and (ii) RWT can be applied successfully to establish causal claims. In Sect. 5, moreover, I will examine the causal accounts that have motivated such criticisms and I will argue that they should be rejected to endorse RWT and a causal account able to accommodate the current use of mechanistic and difference-making evidence in the social sciences. Section 6 will conclude with a note on the relevance of RWT in both its descriptive and normative form.

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1 Introduction

The Russo-Williamson thesis (henceforth RWT) argues that a causal claim can be established only if it can be established that there is a difference-making relationship between the cause and the effect, and that there is a mechanism linking the cause and the effect that is responsible for such a difference-making relationship (Russo & Williamson, 2007). The applicability of RWT was hugely debated in relation to biomedical research (Clarke et al., 2014; Gillies, 2010; Illari, 2011; Weber, 2009; Williamson, 2018). In the social sciences some philosophers and social scientists have advocated the use of different kinds of evidence for causal discoveries (Brady & Collier, 2004; George & Bennett, 2005; Little, 2015; Moneta & Russo, 2014; Shan & Williamson, 2021; Steel, 2004), however others (Reiss, 2009; Claveau, 2012; Runhardt, 2022) have criticised this approach. With this article, I aim to defend RWT from criticisms and to show its relevance in the social sciences.

The paper is structured as follows. In Sect. 2, I will summarise RWT, and in Sect. 3 I will describe how this approach can be applied to the social sciences. In Sect. 4, I will reconstruct two main criticisms of this thesis proposed in the philosophy of the social sciences literature: namely (i) RWT is not used in the social sciences, (ii) RWT does not work. For each criticism I will provide a defence of RWT. My defence will be based on two general considerations: (i) RWT appears perfectly in line with the research methods used in the social sciences and (ii) RWT can be applied successfully to establish causal claims. In Sect. 5, moreover, I will examine the causal accounts that have motivated such criticisms and I will argue that they should be rejected to endorse RWT and a causal account able to accommodate the current use of mechanistic and difference-making evidence in the social sciences. Section 6 will conclude with a note on the relevance of RWT in both its descriptive and normative form.

2 The Russo-Williamson thesis

RWT requires both the identification of a *difference-making* relationship, between the cause and the effect, and the identification of a *mechanism* linking the cause and the effect to establish[1] causation.

The origins of the distinction between difference-making and mechanistic relationships can be traced back to the philosophical discussions on causation that emerged in the second half of the twentieth century. On the one hand, in the so-called 'difference-making accounts', a causal claim is established when there is an appropriate difference-making relationship between the cause A and the effect B (see for instance Eells, 1991; Lewis, 2004; Reichenbach, 1958; Suppes, 1970). Such a relationship is understood either as a probabilistic relationship (A causes B only if A raises the prob-

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[1] It is important to note that, according to RWT, the act of establishing causation is fallible. Combining evidence supporting the presence of a difference-making relationship and evidence supporting the presence of a mechanism can only reduce the probability of incorrect causal inferences (Illari, 2011, p. 146). It follows that RWT does not guarantee the correctness of the causal inference, it only reduces the possibility of methodological bias that might lead to inferential mistakes.

ability of the occurrence of B), or as a counterfactual relationship (A and B are actual events, and if A had not occurred, then B would not have occurred). Evidence in support of difference-making relationships is hence understood as any evidence proving at least one of the following statements: (i) the effect would not occur if the cause did not occur; (ii) the cause *is correlated* to the effect. Evidence from randomised controlled trials, experiments or quantitative analyses counts in general as difference-making evidence. As an illustration, the claim that "smoking causes lung cancer" can be based on evidence showing at least one of the following statements: (i) intervening on smoking behaviours results in a decrease of cancer rates; (ii) when smoking rates decrease, lung cancer rates decrease too; (iii) smoking increases the probability of developing lung cancer. On the other hand, according to the mechanistic accounts, a causal relationship between A and B corresponds to a causal mechanism, or process, linking A and B. This idea has been spelt out in different ways: according to some philosophers (see for instance Dowe, 2007, 1992; Reichenbach, 1958; Salmon, 1984, 1997), a causal mechanism is a spatio-temporal process that should be understood through the language and tools of physics, such as energy and momentum[2]. According to others (Craver, 2006, 2007; Glennan, 2002; Machamer et al., 2000) a causal mechanism is an organised system made of entities and activities. In these terms, for instance, the claim that "smoking causes lung cancer" can be supported by evidence of a sufficiently well understood biological mechanism made of entities (such as proteins and genes) and activities (such as protein expressions or genetic mutations) that links smoking and lung cancer.

RWT requires evidence to support both the claim "there is a difference-making relationship between the cause and the effect", and the claim "there is a mechanism linking the cause and the effect"[3]. In many cases, this requirement is associated with the use of different kinds of studies. While difference-making evidence is in general obtained through randomised controlled trials or statistical studies, evidence of mechanisms is often obtained through a broad group of mechanistic evidence-gathering methods, among which experiments, case studies and observational studies.

Types of evidence and types of evidence-gathering methods, however, do not necessarily coincide. Mechanistic evidence is *not necessarily* collected through mechanistic evidence-gathering methods, similarly difference-making evidence is not always obtained through randomised controlled trials or statistical studies[4]. Evidence of a difference-making relationship just needs to show that the effect does vary with the postulated cause, regardless of what methodology is used to collect it, while evidence of a causal mechanism is evidence that can show the existence of a mechanism.

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[2] In the health science, this conceptualisation of mechanisms has been used to develop the understanding of biomarkers as 'picking-up' signals in the process from exposure to disease (Ghiara & Russo, 2019; Illari & Russo 2016, Vineis et al., 2017).

[3] The amount of evidence should be sufficient to establish the presence of a correlation and the presence of a mechanism. In the case of mechanisms, mechanistic evidence is likely to be partial and to shed light only on some aspects of the mechanism. If researchers have good reasons to think that this information is sufficient, they might decide to establish the presence of the mechanism.

[4] Illari (2011, pp. 5–6), to give an example, argued that mechanistic evidence can be obtained through repeated trials, as happened in the trials conducted by Crick et al., (1961) on chemical mutagens to crack the genetic code.

Based on how a mechanism is spelt out, mechanistic evidence might be evidence of the entities or activities that make up the mechanism, evidence of how such entities and activities are organised, or evidence of a spatial or temporal relationship between the cause and the effect. Mechanistic evidence can be collected through different evidence-gathering methods. To give an example, in epidemiology statistical studies are sometimes used to establish the presence of mechanisms. Some epidemiological studies are based on the study of 'biomarkers', biological data that can be defined as 'events' in the continuum from exposure to disease (Schulte & Perera, 1993, pp. 13–14) or as 'possible intersecting signals' representing parts of a process (Chadeau-Hyam et al., 2011, p. 85). Epidemiologists start by identifying biomarkers of exposure and biomarkers of early disease onset, then they match up biomarkers that correlate with both in the middle. With this 'meet-in-the-middle approach' (Vineis & Perera, 2007), epidemiologists statistically analyse biomarkers to track the entire evolution of disease: through the reconstruction of the link between exposure and disease, they can collect evidence of the disease mechanism at the molecular level[5].

To comply with RWT it is not necessary to use different types of evidence-gathering methods, but to collect evidence that differs based on the objects of evidence. It is worth noting that in several cases different sources of evidence are used to collect evidence supporting different kinds of conclusions. The difference between types of evidence and types of methods is represented in Fig. 1.

3 RWT in the social sciences

Russo and Williamson developed their claim by considering how researchers infer causality in the health sciences, nevertheless they expressed their confidence in the possibility of extending the epistemological claim also to other domains. Recently, moreover, Shan & Williamson (2021) have discussed the applicability of RWT in the social sciences. Like in the health sciences, in the social sciences RWT would normally require both evidence supporting that there is a difference-making relationship between the cause and the effect, and evidence supporting that there is a mechanism linking the cause and the effect.

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[5] An illustrating example where biomarkers are used to collect mechanistic evidence is the case of exposure to aflatoxin. Aflatoxin is a poisonous carcinogen produced by certain fungi which grow in soil, decaying vegetation, hay, and grains. Such fungi can contaminate some types of foods, such as rice and peanuts. If people eat these contaminated foods, they are exposed to aflatoxin. In the liver, aflatoxin is metabolised by CYP450 isoforms to form a reactive intermediate, AFB1-8,9-epoxide. This intermediate, furthermore, can form DNA adducts via covalent binding to the N7 atom of guanine. In this case, aflatoxin-N7-guanine adducts in serum are used as biomarkers of exposure to aflatoxin, while aflatoxin-N7-guanine adducts in the liver are used as biomarkers of early biological effects (Egner et al., 2001). Statistical analyses can help to reconstruct of the link between exposure and disease, and can be used to collect evidence of the disease mechanism at the molecular level.
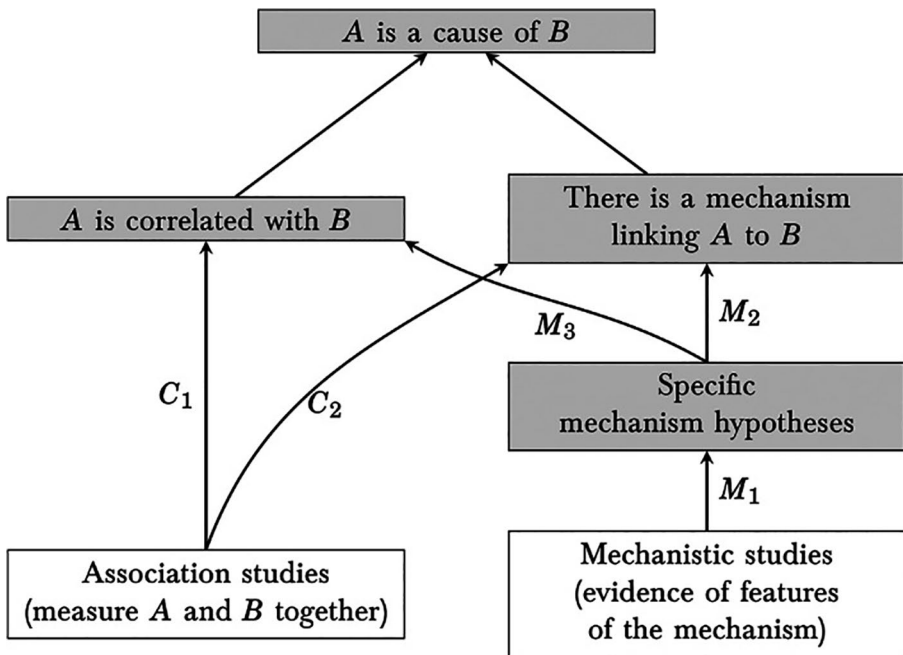
Fig. 1 RWT requires the collection of evidence supporting both the claim "there is a difference-making relationship between the cause and the effect", and the claim "there is a mechanism linking the cause and the effect". It does not require the use of different evidence-gathering methods

3.1 Evidence of difference-making relationships and evidence of mechanisms in the social sciences

Evidence of difference-making relationships in the social sciences does not differ much from evidence of difference-making relationships in the health sciences, as it needs to support at least one of the following statements: (i) the effect would not occur if the cause did not occur; (ii) the cause *is correlated* to the effect. Also in the social sciences, this type of evidence is generally collected through randomised controlled trials, experiments or statistical analyses.

As in the health sciences, moreover, the type of evidence to support the claim that there is a mechanism linking the cause and the effect can vary, given that social causal mechanisms can be spelt out in different ways. The concept of causal mechanisms has been discussed in different social sciences such as psychology, economics, sociology, and political science (see for instance Beach & Pedersen, 2019; George & Bennett, 2005; Gerring, 2008; Hedström & Swedberg, 1998; Hedström & Ylikoski, 2010; Jacobs, 2016; Mahoney, 2001), and has often been influenced by mechanistic discussions in other disciplines, such as biology and the health sciences.

The wide use of the concept of 'social mechanisms' has been accompanied by a heterogeneity of perspectives. In some cases, social mechanisms have become synonymous with 'intervening variables' (e.g. mechanisms are understood as a series of intervening variables through which an explanatory variable can exert an effect

on an outcome variable). King et al., (1994), for instance, have argued that studying mechanisms requires the identification of:

> "a series of causal linkages, to define causality for each pair of consecutive variables in the sequence, and to identify the linkages between any two of these variables and the connections between each pair of variables" (1994, p. 86).

In other cases, however, social scientists have proposed more detailed concepts of causal mechanisms. A 'generative' idea of causal mechanisms, as entities that generate an outcome of interest, has been discussed by many social scientists (Elster, 1989, 1995; George & Bennett, 2005; Little, 2011; Mahoney, 2001; Waldner 2016; Runhardt 2016). While most of them have used or adapted the definition of Machamer et al., (2000), and have focused attention on the entities and activities that constitute the causal mechanisms (Elster, 1989, 1995; George & Bennett, 2005; Little, 2011), other accounts have proposed the idea of generative mechanisms as invariant relationships whose constitutive features constrain their actions (Bennett, 2016; Waldner 2016). In several disciplines, furthermore, social scientists have focused on mechanisms that can lead to the emergence of high-level phenomena. For instance, Stichweh (2020) identified a list of social mechanisms that underlie the process of globalisation, including migration, communication, observation, and knowledge. These mechanisms are sometimes spelt out as chains of events at the micro (individual) level, at the meso (institutional) level, and at the macro (societal) level, other times they are considered as generative mechanisms whose entities and activities constitute the macro-level phenomena (Mayntz, 2004). In disciplines such as history and political science, in addition, social mechanisms are often understood as chains of events leading to the effect under study (Gläser & Laudel, 2019; Lamont & Pierson, 2019).

Although significant differences can be identified across disciplines and theories in relation to how social mechanisms are understood, most of these accounts have some key features in common, and two broad groups emerge through the analysis of these common features[6]. Some social scientists focus their attention on the entities constituting the mechanisms, the relationships between such entities and their activities (see for instance Beach, 2017; Bennet 2016; Elster 1989; Mayntz, 2004). Other social scientists focus on the processes linking the cause and the effect through time and space (see for instance Gläser & Laudel, 2019; Lamont & Pierson, 2019; Little, 2018; Maxwell, 2004a)[7]. These two broad conceptualisations are sometimes

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[6] This broad distinction does not aim at fully categorising all the different ways in which social mechanisms are conceptualised and explored. However, this can help to understand the current mechanistic discussions in the social sciences, as well as some of the methodological debates on mechanistic evidence.

[7] In particular situations, social scientists might explore mechanisms taking into account both their entities and activities, and the sequence of events leading to the outcomes of interest. Some social scientists and philosophers, for instance, have argued that exploring the sequence of macro properties and events is not sufficient in mechanistic studies, as these chains of events should be explored also taking into account the micro-entities and micro-activities that bring about such macro-events (Hedström & Wennberg, 2017; Van de Ven et al., 1999; Pereira et al., 2019). This approach would require identifying the sequence of macro-level events that led to a macro-level outcome, as well as the micro-systems of entities and activities constituting each macro-level phenomenon. Illustrative examples can be found in organisational studies, such as the study on the Minnesota Innovation Research Program conducted by Van de Ven et al. (1999)

compared, with social scientist defending one of them and rejecting the other one. For instance, Beach and Pedersen (2019) argued that:

> "[v]iewing causation in mechanism-based terms means that we explain why something occurred by analyzing the productive processes that link a cause (or set of causes) with an outcome […] A sequence of events tells us who did what but does not tell us why or how the events were linked together in a causal sense." (pp. 30–32).

An illustrating example that shows how a mechanism can be explored by looking at how entities and activities generate the outcome is the well-known segregation mechanism studied by Schelling (1978), which is still applied to current social studies (see for instance Bursell & Jansson, 2018; Paolillo & Lorenz, 2018). According to his studies, individual discriminatory preferences, all together, constitute the neighbourhood structure, which can in turn be characterised by a phenomenon of segregation. The initial mechanistic assumption is that society is composed of individuals who belong to a specific group and who are able to discriminate (i.e. to distinguish between their own group and other groups). In Schelling's mechanistic model, all individuals will be happy to live in a mixed neighbourhood, but will be unhappy if they have minority status. By interacting with each other, each individual—who is free to move if he is discontent with the composition of his neighbourhood—will look for the neighbourhood with the preferred composition. Of course, if an individual abandons his neighbourhood, his activity changes the composition of both his past and future neighbourhoods, with consequences for the others (for instance, some individuals of the same group, now in minority, might decide to leave their neighbourhood). Due to the continuous activities of the agents, everyone will end up living in segregated neighbourhoods. This would be a consequence of the simple individual preference not to live as a minority. In such a case the state of segregation of a population can be explained looking at how entities (individuals) and activities (their movements between one neighbourhood and another) interact, as illustrated in Fig. 2. The overall group is composed of two groups (the red and the blue). After the first individual movements, all individuals react to them with the consequence that, in the end, the two groups are clearly divided.

For what concerns the analysis of causal processes, it should be considered that, unlike in the health sciences, it is difficult to find social phenomena that can be understood as causal processes à la Salmon (Dowe, 1992, 2007; Reichenbach, 1958; Salmon, 1984, 1997). Values and beliefs, for instance, play often a crucial role in social phenomena, and cannot be spelt out in terms of physical quantities. When social scientists explore causal processes, consequently, they often consider a group or chain of events that leads to specific effects. Maxwell (2004a, p. 5), for instance, argued that causal processes are "processes by which some events influence others",

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and the internationalisations study by Pereira et al. (2019), where the authors recognised "the internationalization strategy as a process that occurs in a sequence of stages and events in a historical development of design company" (p. 110), but where each stage was interpreted as caused by individual and organizational actions, as well as the networks of entrepreneurs' relationships (p 110, p. 127).

Fig. 2 The complex system of segregation. Figure from Cortez & Rica (2015, p. 64)
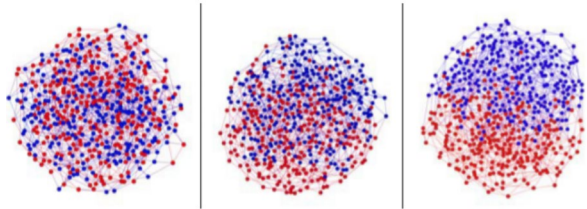

while Little (2018, p. 415) described them as a combination of social conditions, constraints, or circumstances that together bring about a causal effect.

Skocpol's political study (1979) provides an example of how social scientists can explore a social phenomenon by looking at the processes linking the cause and the effect through time and space. By analysing social revolutions in France (1788-9), China (1911–1916) and Russia (1917), Skocpol developed a reconstruction of the common causal chain that led, in the three different contexts, to a revolution. The key steps of the causal chain were, according to her study, (i) the growing political pressure from more economically developed countries; (ii) an agrarian economy (peasants as a major presence) and (iii) a non-autonomous State (for instance, the dominant class had strong political leverage and could contrast the State's decisions). Together, these factors caused a State breakdown. For instance, in China the breakdown followed the transfer of power to the regional level that had occurred in the final years of the old regime, before 1911. At the same time, (iv) peasant autonomy and (v) landlord vulnerability led to a massive peasant revolt. Together, finally, the State breakdown and the peasant revolt caused a social revolution, as illustrated in Fig. 3.

3.2 Mixed methods studies and RWT

When looking at causal studies in the social sciences, it emerges that there are numerous mixed methods studies where causation was established by establishing the presence of a mechanism and the presence of a difference-making relationship, although in most cases the use of evidential pluralism was not explicit. Examples include the study conducted by Steinert et al. on how financial skills and optimism can impact on financial behaviours (2020), Wood's study on the reasons why peasants in El Salva-
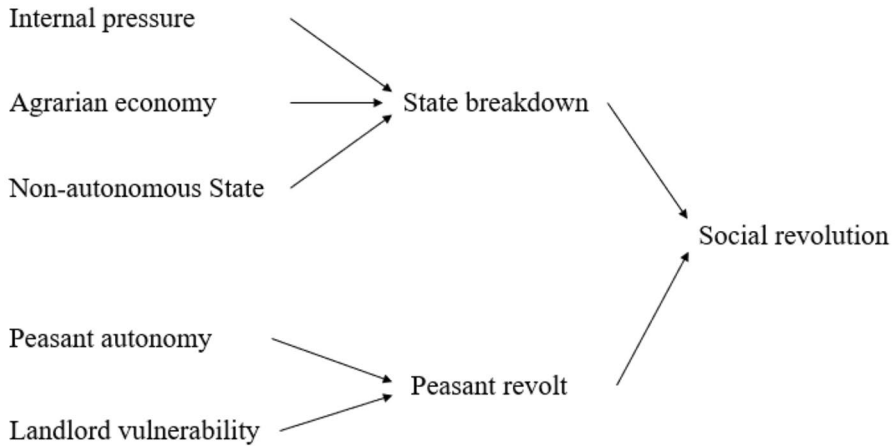
Fig. 3 The causal process leading to social revolutions studied by Skocpol (1979)

dor decided to join rebel movements (2003), and the study conducted by Weinstein on insurgent violence (2007).

The combination and integration of quantitative and qualitative methods in the same study is not new in the social sciences (Maxwell, 2016), however in the last few decades social scientists have begun to consider it as a research methodology with a recognised name, a distinct identity and specific debates (Denscombe, 2008). Thanks to the emergence of such debates within the community, it is now easy to find methodological claims that appear to be very similar to what proposed by the RWT.

To begin with, the popularity of mixed methods research has been interpreted by some social scientists as a 'renaissance' of qualitative research which, according to some mixed methods proponents, has been marginalised for a long time in the social sciences (see for instance Karasz & Singelis (2009) on how qualitative and mixed methods research managed to re-establish themselves in cross-cultural psychology). Over the last few decades, therefore, new debates have emerged to defend the crucial role played by qualitative research in the social sciences and support the mixed methods approach. One of the most common ideas proposed in the literature is the claim according to which qualitative methods are needed in causal studies to identify causal mechanisms. To give an example, Weiss (1995) claimed that:

> "[…] quantitative studies support an assertion of causation by showing a correlation between an earlier event and a subsequent event. An analysis of data collected in a large-scale sample survey might, for example, show that there is a correlation between the level of the wife's education and the presence of a companionable marriage. In qualitative studies we would look for a process through which the wife's education or factors associated with her education express themselves in marital interaction." (Weiss, 1995, p. 179).

A similar idea was suggested also by Harding & Seefeldt (2013):

"The most important strength of qualitative methodology for causal analysis is its ability to understand processes or mechanisms. As Lin (1998) notes, although analysis of quantitative data can show 'whether two or more phenomenon are linked consistently, it does not explain why the link exists'." (p. 167).

The literature on mixed methods research is characterised by numerous claims according to which qualitative approaches contribute to the identification of causal mechanisms or processes responsible for social phenomena (see also Cyr & Mahoney, 2016, p. 442; Fearon & Laitin 2008, p. 1167; Yoshikawa et al., 2013, pp. 8–9), and therefore the combination of quantitative and qualitative approaches can contribute to exploring not only statistical associations, but also the mechanisms causing them.

Similar claims have also been discussed in relation to the overall aim of mixed methods studies:

"Done well, multimethod research combines the strength of large-N designs for identifying empirical regularities and patterns, and the strength of case studies for revealing the causal mechanisms that give rise to political outcomes of interest". (Fearon & Laitin, 2011, p. 759).

In the last 10 years, some philosophers have started examining such claims. Crasnow (2011, 2012, 2019), for instance, has considered that there are some parallels between the RWT and mixed methods, as there are cases where qualitative methods (such as case studies) and quantitative methods (such as experimental and statistical studies) can be combined to support the same causal claim. For instance, quantitative methods could be used to establish that there is a difference-making relationship between two events (the putative cause and the effect) in the first place, or could support the presence of a mechanism by confirming correlations between elements from the cause to the effect, as hypothesized (2019, p. 43).

According to Crasnow, however, such combinations require investigating how different methodologies can converge to provide evidence for the same cause (Crasnow, 2012, 2019). A case in point, as argued by Crasnow, is the fact that qualitative approaches such as case studies often investigate singular causes in specific contexts, while quantitative methods aim at generic causal claims. It follows that social scientists need to explore the compatibility of a singular cause with the statistical account.

Similar considerations have been proposed by Johnson, Russo & Schoonenboom (2019), who argued that proponents of mixed methods should carefully consider how methodologies, ontological and epistemological considerations can be combined in each mixed methods research study.

More recently, Shan & Williamson (2021) have argued that the form of evidential pluralism put forward by the RWT helps to provide a philosophical foundation for mixed methods. So far, they argued, mixed methods can at best be considered as one of several possible methodological options available to the paradigms that exist in the social sciences (such as positivism, postpositivism, constructivism, interpretivism, critical realism and pragmatism). Evidential pluralism, in contrast to the other paradigms, offers normative grounds for using mixed methods, and helps justify why mixed methods are better than a single method on its own.

Shan & Williamson ([2021](#)) have provided a convincing argument in favour of evidential pluralism as a normative framework in mixed methods studies. It should be noted, however, that the form of evidential pluralism considered by these authors, as detailed in the RWT, is purely an account of the epistemology of causation, which cannot provide any form of metaphysical foundations. As considered by Crasnow ([2012](#), [2019](#)), however, metaphysical tensions are often at the centres of the mixed methods debates, as different methods might rely on paradigms that consider causal relationships at different levels of abstraction. An illustrative example is the debate about the dominant/less-dominant and the equal status designs in mixed methods. According to such discussions, the dominance of one method in mixed methods studies is generally reflected in the presence of a dominant paradigm, while only small components are drawn from alternative paradigms. On the contrary, the equal status design is referred to the situations where more paradigms are equally relevant to a study (Creswell, [1994](#); Tashakkori & Teddlie, [2003](#)).

It follows that, while the RWT can provide a normative framework for mixed methods, helping social scientists to justify why mixing methods should be preferred to single method study, mixed methods studies also require explicit metaphysical discussions to fully articulate their causal approach and ensure methods can be effectively combined.

A final example can help to clarify this point. Let us consider Wood's ([2003](#)) study on why peasants in El Salvador decided to join rebel movements. Wood used qualitative ethnographic interviews both with peasants and some members of the elite opposed to the peasants (i.e., landlords, military officers, government officials), as well as quantitative analyses of a rural household survey carried out at the end of the war, elections data, and some databases documenting the changes in agrarian property rights during and after the insurgence.

The concept of causation addressed through the case studies corresponded to a complex phenomenon existing at the local level: as argued by Wood, indeed, her analysis helped her to identify some causal processes which were all local and interacted in intricate ways during the period of the civil war (Wood, [2003](#)). On the contrary, quantitative analyses provided evidence of difference-making relationships which were argued to be generalisable, and were then used to develop a generic causal claim through a formal quantitative model based on the dynamics of a coordination (assurance) game.

The combination of qualitative and quantitative approaches enabled Wood to achieve two distinct purposes: on the one hand, she established that complex interactions of personal, historical, and political factors have caused the specific local phenomenon under study; on the other hand, she provided a causal study of the general phenomenon whereby repression and a sense of agency can foster mobilization.

3.3 Collecting mechanistic evidence: the use of process tracing

As argued in Sect. [2](#), the type of evidence to support the claim that there is a mechanism linking the cause and the effect can vary, and several methods can be used to collect such evidence. A popular approach that has been often discussed by social scientists in the last few decades is known by the name of process tracing. This has

been used as an umbrella term in the social sciences and philosophy, with different definitions and methodological discussions (see for instance Beach & Pedersen, 2013; Bennett & Checkel, 2015; Collier, 2011; Crasnow, 2017; George & Bennett, 2005; Ruzzene, 2014; Kincaid, 2012).

While most scholars tend to agree that it is a method aimed at collecting mechanistic evidence, such superficial agreement hides deeper differences that can be linked to the two broad concepts of social mechanisms outlined in Sect. 3.1. Some scholars see process-tracing as an approach to reconstruct the chain of events that led to the outcome of interest. Little (1998) has been one of the first scholars who have outlined this idea. He focused on historical events and argued that the most prominent use of process tracing should be to articulate historical narratives, such as why the Nicaraguan revolution occurred. More recently, George and Bennet (2005), using the work of Salmon on causal processes, argued that process tracing consists in tracing the detailed chains of events that brought the phenomena of interest about. Similarly, Bennet and Checkel (2012) defined process tracing as the approach to uncover mechanisms, understood as:

> "ultimately unobservable physical, social, or psychological processes through which agents with causal capacities operate, but only in specific contexts or conditions, to transfer energy, information, or matter to other entities" (p. 15).

Other scholars' view on process tracing, however, is distanced from that idea. For instance, in their popular work Beach and Pedersen (2019) referred to mechanisms as a system of entities and activities when discussing the aims of process tracing. Notably, Machamer et al., (2000) wrote that:

> "complete descriptions of mechanisms exhibit productive continuity without gaps from the set up to termination conditions." (p. 3).

In parallel, Beach & Pedersen (2013) claimed that:

> "viewing causation in mechanism-based terms means that we explain why something occurred by analyzing the productive processes that link a cause (or set of causes) with an outcome." (p. 30).

Interestingly, different discussions have emerged also in relation to the methods that should be employed for process tracing. Several authors have mentioned the importance of qualitative research and have claimed that in-depth case study work is vital to identify causal processes. An exemplar of process tracing based on case studies often cited in the literature is Elisabeth Wood's (2003) work on the Salvadoran civil war (see for instance citations in Lyall 2015, 189–191; Checkel 2021). Through interviews, political ethnography and ethnographic mapmaking workshops, Wood collected high-quality data which was then examined to draw inferences on insurgent preferences and threats to the validity of those inferences. Wood devoted an entire chapter of her book on the methodology implied to draw conclusions, making her approach very transparent.

However, for some authors quantitative methods can contribute to the collection of mechanistic evidence. Beach & Pedersen (2013), for instance, have considered that statistical methods could help to collect what they call 'pattern evidence': predictions of statistical patterns in the evidence could be tested to verify if a mechanism operated as expected. When testing a mechanism of racial discrimination in employment, to give an example, statistical methods could be used to test the presence of patterns of employment.

Such methodological discussions on the use of quantitative and qualitative approaches for process tracing appear consistent with the arrows C_2 and M_2 of Fig. 1 above.

3.4 Examples of RWT in the social sciences

3.4.1 Studying the causal relationship between natural resources and civil wars

To show how RWT is used in the social sciences, let us consider some examples. To begin with, we can analyse the causal debate in political science about the relationship between natural resources and civil war. As explained by Ross (2004), several studies identified a strong correlation between natural resources and civil war in different cases. Collier & Hoeffler (1998), for instance, argued that states that massively export primary commodities have a higher risk of civil war if compared to resource-poor states. Buhaug & Gates (2002), furthermore, discovered a strong correlation between the incidence of natural resources in the conflict zone, and the scope of the conflict (in terms of the conflict's geographical area). Ross argued that statistical correlations cannot make a causal claim complete and persuasive, and considered that the correlation between natural resources and civil war could be spurious:

> "[…] both civil war and resource dependence might be independently caused by some unmeasured third variable, such as a weak rule of law. A state where the rule of law is weak might be unable to attract investment in its manufacturing sector, and hence would depend more heavily on resource exports; this state might also face a heightened risk of civil war through a different process. The result could be a statistically significant correlation between resource dependence and civil war, even though neither factor would cause the other" (Ross, 2004, p. 36).

It was this reason that motivated political scientists to look for causal mechanisms able to account for such a correlation. Since several mechanistic hypotheses were proposed in the literature, Ross verified their presence in thirteen cases of civil wars, using case studies to trace the processes leading to civil wars. He focused his attention on seven mechanistic hypotheses (to give an example, one of the hypotheses was that the availability of natural resources offers the population of resource-rich zones an incentive to form a separate state, and this increases the probability of civil war). He found out that five of these mechanisms operated in the cases under study, and identified also four unforeseen mechanisms linking resource wealth and civil war. To give an example, Ross observed that, in several cases, resource wealth contributed

to the outbreak of conflict by creating an incentive for a separatist rebellion, or by causing foreign interventions to support a rebel movement, which in turn caused civil wars. The possibility of observing the hypothesised causal mechanisms at work led Ross to conclude that there was sufficient evidence in all the thirteen cases to support the claim according to which natural resource wealth is causally linked to civil conflicts (Ross, 2004, p. 61).

3.4.2 Studying the causal relationship between abortion legalisation and crime rates

A third example of the use of RWT in the social sciences is the study conducted by economists Donohue and Levitt (2001), that argued that legalisation of abortion in 1973 caused the unexpected decline in crime rates in the 1990s. In order to support their claim, Donohue and Levitt observed that in five states in the USA (Alaska, California, Hawaii, New York, and Washington) abortion became legal around 1970, while in the remaining states, abortion was not legalised until 1973. Since before 1970, trends were not statistically different across early legalising and all other states in the USA, Donohue and Levitt analysed if it was possible to find a difference-making relationship linking early abortion legalisation and crime. The authors were not only able to establish the presence of such difference-making relationship, but collected also evidence that the reduction of crime rates resulted from cohorts born after that abortion became legal. Through survey analysis and experimental studies, moreover, Donohue and Levitt established the presence of two mechanisms, understood as a sequence of events that led from new legislation to social changes which, in the end, led to a reduced in crime rates. The abortion legalisation led to a significant number of unwanted pregnancies that ended in induced abortion. This in turn reduced the total number of births in those years, and to a reduced cohort of young people who committed crimes 18 years later. In other words, with the reduction of the population, crimes decreased as well. This first mechanism was combined with a second discovered mechanism, whereby most of the abortion happened in vulnerable households, where disadvantaged situations, complex family needs and poor parenting practices were more likely and could increase the likelihood of engaging in criminal behaviours for children and young people. As argued by the authors, legalisation of abortion enabled parents to avoid unwanted pregnancies in cases of vulnerability and difficult family circumstances, and this led to a decrease in adverse childhood circumstances that were likely to influence behaviours during adolescence and adulthood. In a recent publication (2019), the authors discussed again this mechanism, and provided additional evidence considering the mechanisms through which "optimizing the circumstances of pregnancy and early childhood can improve life prospects on everything from cognitive development and physical and mental health to educational success, earnings, and avoidance of crime (Almond, Currie, and Duque 2018)" (2019, p. 45).

3.4.3　Studying the causal relationship between economic deprivation and child outcomes

A third example is the identification of a causal link between households' financial stress and child outcomes. The difference-making relationships between economic deprivation at the family level and poor child outcomes, including poor mental health, behavioural problems and poor educational attainment, are well established in the social sciences (see for instance Dearing et al., 2006; Sun et al., 2015). In the last 20 years, difference-making evidence has led several social scientists to explore whether the associations are causal, and to identify potential mechanisms. A mechanism whereby economic deprivation induces parental stress, which leads to poor parental relationship and parenting styles, which in turn impact child outcomes, has been initially supported by cross-sectional studies showing associations between financial stress, parental distress, punitive discipline, and child internalising and externalising problems (Gershoff et al. 2007; Kiernan and Huerta 2008; Rijlaarsdam et al. 2013). The establish the existence of this mechanism, longitudinal studies have been employed (Gard et al., 2020; White et al., 2015). These have confirmed the directional associations between these factors, and have led social scientists to establish the causal relationship linking economic deprivation and child outcomes.

3.4.4　Studying the causes of the Mexico–U.S. migration

Another example is the mixed methods study conducted by sociologists Garip & Asad (2016) to explore the cases of the growing Mexico–U.S. migration. Garip and Asad started their study by statistically analysing data from 92,527 Mexican individuals to identify difference-making relationships between socio-economic variables and migration. This analysis helped the authors to identify that there was a difference-making relationship between higher prevalence of migration in the community and in the household, and migratory behaviours. The authors also identified that migration did not rise significantly when the probability of available visas to Mexican migrants was higher.

Such findings were combined with findings obtained from the analysis of qualitative data collected through 138 in-depth interviews conducted in 120 households in the summer months of 2011 and 2013. Qualitative analysis helped to identify the mechanisms responsible for the difference-making relationship. The most relevant operating mechanism, researchers discovered, was social facilitation: in 129 interviews migrants and relatives mentioned the help offered by others to cross the border or to find a job and accommodation. Due to the risk associated with these tasks, many migrants clarified that they only relied on strong ties, and that such ties played a determinant role in their decision to migrate. For instance, a migrant's wife considered how the presence of some relatives changed her husband's perspective, making him think about the possibility of migrating: "An opportunity came up so that my siblings could help him—because nobody from his family was there—only my family. His cousins said they'd go with him, but they didn't, so we called my sisters, and they said he could go with them. That's why he left." (Garip & Asad, 2016, p. 1180). From the interviews, researchers were also able to collect evidence of the presence

of the normative influence mechanism. 51 interviews cast light on how communities and families often try to persuade the migrant to go by making very explicit their approval, while other respondents described the shame felt by migrants when their experiences and the expectations of their families do not match. The high expectations in the sending communities and families, furthermore, were powered by the decision made by migrants with negative experiences not to return or share their stories because of the shame felt.

4 Defending RWT from criticisms

Although several causal studies in the social sciences apparently establish both difference-making and mechanistic claims, some criticisms have been raised questioning whether RWT can be applied to the social sciences (Claveau, 2012; Reiss, 2009). These criticisms are based both on descriptive and normative observations and can be divided into 2 separate arguments. All these arguments are about the type of claims established in the social sciences, and do not discuss pluralism of evidence-gathering methods. In other words, they focus only on the top of Fig. 1.

4.1 Against descriptive RWT: social scientists do not use it

RWT contains a descriptive claim according to which scientists establish a difference-making relationship as well as a mechanistic relationship between the cause and the effect when they establish causation. Claveau (2012) disagreed with this observation, and based his criticism on a concrete case study: the analysis of the causal relationships, across countries, between unemployment, the unemployment benefit system and the employment protection legislation. To examine RWT, the author reconstructed how economists established causal claims concerning the causes of unemployment (Claveau, 2012, p. 808).

Three causal relationships were accepted within the scientific community: (i) unemployment benefits increase unemployment, (ii) the strictness of the unemployment benefit eligibility conditions—linked to 'job search intensity'—reduces unemployment, iii) the strictness of the employment protection legislation has no net effect on unemployment. The first and the third claims were supported by evidence of difference-making relationships obtained through regression analyses, and by evidence of causal mechanisms collected by means of micro-data studies focused on potential causal pathways between the cause and the effect. Nevertheless, the second claim ("the strictness of the unemployment benefit eligibility conditions—linked to 'job search intensity'—reduces unemployment") was established by identifying only the presence of a causal mechanism, without collecting difference-making evidence (Claveau, 2012, p. 812). Claveau argued that this happened because economists did not find a measure of the strictness of unemployment benefit eligibility that was comparable across countries. Due to this limitation, economists decided to establish a causal claim just considering some evidence obtained through mechanistic studies. This situation, hence, is in contrast with the descriptive form of RWT.

It is important to add that, when Claveau proposed a counterexample to RWT, he also considered that the combination of difference-making and mechanistic evidence is used by social scientists only because it is very rare to conduct a good difference-making study with quality high enough to rule out the risk of bias. In fact, Claveau defended a monistic account of causation, according to which causal relationships should be conceptualised as difference-making relationships based on the counterfactual-manipulationist account. In his view, reliable difference-making evidence would be sufficient to establish causal relationships, but given the methodological limitations linked to the collection of this evidence, social scientists prefer to use also evidence supporting the presence of a mechanism when they establish causation:

> "it would be an anomaly for the counterfactual-manipulationist account if other (mechanistic) evidence for a specific claim was demanded even though this same claim was already backed by the best difference-making evidence" (Claveau, 2012, p. 809).

4.1.1 A defence of descriptive RWT: social scientists comply with RWT

Russo and Williamson's descriptive claim is based on the observation that, in the social sciences, researchers tend to use a plurality of evidence to support and establish causal relationships. As described by Claveau himself, for instance, for two of the three causal claims established, economists collected both evidence of difference-making relationships and evidence of mechanistic relationships.

From this claim, however, it cannot be excluded that, under particular circumstances, social scientists can establish a causal claim using just one type of study. As illustrated in Fig. 1, there are cases where either mechanistic studies can be used to establish difference-making relationships, or statistical studies can be used to establish the presence of mechanisms. Illari (2011, pp. 5–6), for instance, described a case where researchers established the presence of a mechanism by collecting evidence from repeated trials (Crick et al., 1961).

This consideration can be used to develop a possible answer to Claveau's criticism[8]. It could be argued that, in the case described by Claveau, the mechanistic studies conducted by researchers were sufficiently good to allow them to establish both the presence of a mechanism between the cause and the effect, and the presence of a difference-making relationship linking the cause to the effect. In the context described by Claveau, this answer seems plausible: economists established the presence of a mechanism using theoretical models, simulations, and micro-data studies conducted in several countries (see Fredriksson & Holmlund, 2006, pp. 16–25). In

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[8] Similar considerations have been proposed by Shan & Williamson (2021). Shan and Williamson presented two counterarguments: (1) there was good evidence of correlation in that case, therefore the authors could establish causation; (2) the mechanistic evidence was not enough on its own to establish causation generally, and the causal claim was established only in specific countries. The first counterargument arrives at the same conclusion as the first answer presented in this paper: the combination of the evidence collected was sufficient to establish the causal claim. The second counterargument, like my second potential answer, argues that the available evidence was not wholly conclusive.

addition, some difference-making evidence was collected by means of randomised controlled trials (see for instance Ashenfelter et al., 1999). Although evidence from trials was not sufficient, according to researchers, to establish the presence of a difference-making relationship, the combination of this evidence with the set of information obtained through mechanistic studies could have been considered sufficient to establish the presence both of a mechanism and of a difference-making relationship.

There is a second possible answer that can be offered to Claveau: due to the impossibility of establishing a difference-making relationship, economists did not establish the presence of a causal relationship but only argued that the strictness of the unemployment benefit eligibility conditions *is likely* to reduce unemployment. In the review of the literature published by Fredriksson & Holmlund (2006) cited by Claveau, for instance, the authors considered that the available evidence was not wholly conclusive and concluded that:

> "more stringent search requirements *are likely* to speed up transitions to employment" (Fredriksson & Holmlund, 2006, p. 25).

If one of these two answers is accepted, then it might be possible to conclude that the case proposed by Claveau does not pose a problem for RWT.

Someone, however, might reject both these answers, and could argue that economists actually established causation without having established difference-making relationships. This position would cause a problem to RWT because it would be understood as an exception, a case in which RWT did not hold. The answer to this argument could be that exceptions do not pose a real problem to descriptive RWT. While in their first discussion of RWT (2007), Russo and Williamson did not specify it, recently Williamson (2018) has clarified that *normally*, in order to establish a causal claim, one needs to establish both difference-making relationship and mechanism (Williamson, 2018, p. 33). It is hence possible to have cases where causation is established even if either the presence of a mechanism or the presence of a difference-making relationship is not established. In these terms, Claveau's case study can be accepted as one of the exceptions where a causal claim is established without establishing the presence of a difference-making relationship.

It is important to note that Williamson has changed RWT having in mind some situations where either a difference-making relationship or a causal mechanism does not exist. Claveau's criticism, instead, simply shows a case where researchers were not able to collect sufficient evidence to establish difference-making relationship. Their decision to establish causation appears motivated by the fact that their good mechanistic studies and some (insufficient) difference-making evidence from randomised controlled trials led them to believe in the presence of an unmeasurable correlation. Although it remains possible that causation was actually studied without establishing the presence of a difference-making relationship, it seems more plausible that the combination of mechanistic evidence and evidence from randomised controlled trials allowed researchers to establish the presence of a difference-making relationship.

Moreover, it can also be considered that Claveau himself recognised this as an exceptional situation, and argued that:

"one should not be surprised to see that, if a measure of Bs comparable across countries becomes available, economists will use it to test $B_s^{(-)} \Diamond U$ [i.e. the strictness of the unemployment benefit eligibility conditions—linked to 'job search intensity'—reduces unemployment]. Evidential variety will just make economists more comfortable in holding this claim" (p. 812).

Overall, Claveau's criticism can be solved in three ways. The most plausible answer is that researchers do not need a statistical study to establish the presence of a correlation between the cause and the effect. In this case, the mechanistic studies conducted by researchers were sufficiently good to allow economists to establish both a correlation and a mechanism between the cause and the effect. Second, it can be claimed that this case is perfectly consistent with RWT because, due to the lack of difference-making evidence, researchers did not establish causation but only claimed that the strictness of the unemployment benefit eligibility conditions *is likely* to reduce unemployment. Finally, if it is confirmed that researchers did not establish a correlation but established causation, it might be argued that, in general, researchers need to establish the presence both of a correlation and of a mechanism in order to properly establish causation, but there can be exceptions. In such a context, Claveau's example can be considered an exception.

Finally, let us consider Claveau's monistic account of causation. Although Claveau's account does not pose an obstacle to RWT, according to his view the only reason why social scientists study mechanisms alongside difference-making relationships and collect mechanistic evidence is because they want to establish the presence of a difference-making relationship. Social scientists, in other words, do not understand causation in mechanistic terms. This, however, appears in contrast with the examples discussed in Sect. 3.1 and 3.2, and with the emergence of new methodological approaches such as mixed methods and process tracing, which rely on the idea that causal relationships entail the presence of mechanisms linking the cause and the effect, and the presence of a difference-making relationship. For this reason, it can be argued that Claveau's account does not appear in line with how social scientists study causal relationships.

4.2 Against normative RWT: RWT does not work

Reiss (2009) has argued that RWT does not work by considering the following scenario: let's suppose we want to understand if watching violent TV programs causes violent behaviours. We start by searching for a causal mechanism, and we find out that, in a sample population, consumers identify themselves with aggressive characters and start confusing reality and fantasy, with the consequence that they begin to believe that the depicted scenarios are realistic. This, in turn, leads them to react violently even in real-life situations. Now that we have evidence of a mechanism in support of our causal hypothesis, we look at the difference-making relationship between violent TV programs and violent behaviours in the total population under study, and we collect evidence of a difference-making relationship. It seems, hence, that we can establish our causal claim.
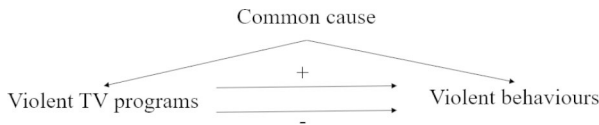
Fig. 4 The relationship according to which watching violent TV programs increases violent behaviours is masked by another causal mechanism whereby watching violent TV programs decreases violent behaviours. The remaining probabilistic relationship between watching violent TV programs and violent behaviours is brought about by a common cause

The problem, however, is that the correlation supporting the difference-making relationship is actually brought about by a common cause that was not measured. In other words, the correlation that we are considering is spurious. This happens because, rather than having just one causal mechanism linking violent TV programs and violent behaviours, in the population under study there are two acting mechanisms. This phenomenon is generally known by the name of masking: more mechanisms interact and the operation of one mechanism 'masks' the operation of another mechanism, as described in Fig. 4. The second mechanism, for instance, might lower the violence in some of the consumers because TV consumption acts as a deterrent. In such a way, the effects of the two mechanisms cancel each other out and, if it were not for the spurious correlation, we would not find any difference-making relationship between violent TV programs and violent behaviours.

In addition to this fictitious example, Reiss' criticism that RWT does not work is based on a more critical position, according to which there are various meanings of the word 'cause', and researchers can use different concepts of causation on different occasions, based on the available evidence and the target of these inferences. According to Reiss' account, different types of evidence should be used to study different causal claims:

> "In our example, the hypothesis we can hope to establish or reject on the basis of statistical evidence is a probabilistic one: in a causally homogeneous population, is violence correlated with the consumption of violent TV programs? (Answer in the example: no.) Using mechanistic evidence, by contrast, we can hope to establish or reject a mechanistic hypothesis: is there, in some individuals, a continuous mechanism from "input variable"—TV consumption—to "output variable"—violence? (Answer in the example: yes.)" (Reiss, 2009, p. 31).

This plurality of concepts of causation poses a problem to RWT because such concepts, according to Reiss, do not necessarily overlap. If concepts of causation are not overlapping, social scientists cannot use different types of evidence to establish a single causal relationship. Rather, depending on what type of evidence is used, they would need to change the causal hypothesis to be tested, as in the case of the relationship between TV consumption and violence.

To clarify his claim, Reiss described some common situations that are characterised by non-overlapping concepts of causation: those where omissions have causal power, and those where there is a problem of masking. To begin with, he considered

that there are several cases in the social sciences where omissions are claimed to cause phenomena: negligence in civil law, for instance, is in general understood as a failure to act, and is often claimed to be the cause of some effects (such as the complainant's harm) even if it is impossible to find a physical mechanism between them. In addition, he observed, the presence of a mechanism does not exclude the possibility that the overall influence of the cause to the effect is null. Masking situations can hence be interpreted as cases where mechanisms and difference-making relationships do not coexist.

Reiss argued that, due to these situations, establishing a causal claim under one concept of causality does not always secure the possibility to infer other forms of causal relations. Consequently, social scientists should not be asked to collect both evidence of mechanisms and evidence of difference-making relationships to establish causal claims.

4.2.1 A first defence of normative RWT: RWT works in the social sciences

My answer to the first part of Reiss' criticism is that RWT requires that, in order to properly establish causation, researchers properly establish the presence of a difference-making relationship and of a mechanism. In Reiss' example, however, it can be argued that the difference-making relationship was not properly established because the study did not allow researchers to claim that there was a probabilistic dependence between watching violent TV programs and violent behaviours *conditional on potential confounders*[9] (Williamson, 2018, p. 36). Researchers did not rule out the possibility of confounders, otherwise they would have discovered the presence of the common cause responsible for the difference-making relationship. This consideration is sufficient to conclude that, in Reiss' example, researchers did not properly establish a difference-making relationship and, consequently, did not comply with RWT. Therefore, the inferential mistake described by Reiss is not due to RWT, and there is no reason to reject the normative dimension of RWT.

Reiss might reply that there are cases where researchers properly establish a difference-making relationship after having ruled out all the possible confounders they were able to hypothesise. However, they may not have been able to imagine a specific possible confounder Z, with the consequence that they might not check if the probabilistic dependence between the cause and the effect is conditional on Z. This might lead them to establish the presence of a difference-making relationship between the cause and the effect even if the correlation is caused by Z.

In this context, my response would be that RWT is a thesis about how to properly establish causation and to reduce the risk of bias. In some situations, researchers can conduct high-quality studies, rule out the possibility of confounders and properly establish causation. Establishing causation, however, is fallible: it follows that researchers can properly establish a causal relationship that, in reality, does not exist. The normative dimension of RWT is based on the claim that evidence of difference-

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[9] It is important to specify that RWT does not require that researchers test all the confounders that can be found, but only to think about possible confounders and to verify their absence. Background information, in general, plays a vital role in this process.

making relationships and evidence of mechanisms have different weaknesses, therefore through their combination scientists can *reduce* the probability of incorrect causal inferences (Illari, 2011, p. 146). It is not claimed that RWT helps to rule out all possible inferential mistakes: properly establishing both the presence of a correlation and the presence of a mechanism does not guarantee the correctness of the causal inference, it only *reduces the possibility of methodological bias* that might lead to inferential mistakes.

Consequently, even if Reiss could offer real-life examples in which causal relationships are properly established but there are inferential mistakes, this would not cause substantial problems to RWT.

4.2.2 A second defence of normative RWT: RWT fits scientific practice

The second part of Reiss's criticism is based on his account according to which there are various meanings of the word 'cause', and researchers can use different concepts of causation on different occasions, based on the available evidence and the target of these inferences. Section 3.4 has provided several examples of causal studies in the social sciences where the authors comply with RWT. Section 3.2, moreover, has argued that the discussion on mixed methods shows relevant similarities with discussions concerning evidential pluralism. While these considerations, alone, might be sufficient to reject Reiss's criticism, it is worth adding that discussions on causality often start with the general consideration that "correlation does not imply causation", and that the existence of a correlation and the identification of a mechanism support the same causal claim. A leading proponent of this idea was Elster, who claimed that:

> "Causal explanations must be distinguished from assertions about correlation. Sometimes we are in a position to say that an event of a certain type is invariably or usually followed by an event of another kind. This does not allow us to say that events of the first type cause events of the second" (Elster, 1989, p. 5).

More recently, George and Bennet discussed a very similar idea:

> "Case studies can also explore the possible causal mechanisms behind the correlations or patterns observed in statistical studies, providing a check on whether correlations are spurious or potentially causal and adding details on how hypothesised causal mechanisms operate." (George & Bennett, 2005, p. 34).

The limitations of correlations were discussed also by Elsenbroich, who suggested that:

> "Seeing the social sciences as concerned with mechanisms means to not allow "black-box explanations" such as statistical correlations. Although statistical correlations *can be used as evidence for causal associations*, they are not an explanation in themselves as they do not lay open the "cogs and wheels"

operating to produce the phenomenon in question." (Elsenbroich, 2012, p. 5, emphasis added).

Finally, a very similar point was proposed also by Friedrichs a couple of years ago:

"Without an identifiable mechanism, covering laws and statistical correlations […] cannot be interpreted as causal." (Friedrichs, 2016, p. 4).

These and similar claims appear in contrast with Reiss' descriptive argument according to which each type of evidence *is attached to its own concept* of causation. In general, social scientists disagree with the idea that "X causes Y" can be interpreted just as "there is a correlation between X and Y", nothing more. It follows that RWT can be considered a feasible and accepted approach, while it is difficult to find cases where social scientists use different types of evidence to support different causal claims.

5 Overcoming pluralistic and monistic accounts of causation

There is a growing literature that tries to identify what account of causation best fits the social sciences (Della Porta & Keating, 2008; Rohlfing & Zuber, 2021). According to pluralistic accounts, different notions of causes fit different contexts, and each type of evidence is attached to its own concept of causation. This is, for instance, the position defended by Reiss. According to monistic accounts, a single notion of causation accounts for causal relations in all domains. In general, monistic accounts are based on the mechanistic or the difference-making approach, as described in Sect. 2. Claveau, for instance, defended the monistic account of causation according to which all causal relationships are difference-making (counterfactual-manipulationist) relationships.

As already argued by Shan & Williamson (2021) however, these pluralistic and monistic accounts of causation do not cohere with practice in the social sciences. In this paper I have presented several examples where social scientists explicitly collected difference-making and mechanistic evidence to establish both the presence of a difference-making relationship and of a mechanism between the cause and the effect. By clarifying how and why social scientists use different types of causal evidence, RWT can help to overcome the accounts of causation unable to adequately acknowledge and explain the need for both difference-making and mechanistic evidence.

It is important to note that, although Russo and Williamson in their original article argued for a metaphysical account of causation (the epistemic theory of causality), RWT does not say anything directly about the concept of causation that researchers should endorse (see also Williamson 2019). Different accounts of causation consistent with RWT can hence be endorsed by social scientists. It follows that accepting RWT does leave open the question of what concept of causation best fits the social sciences. Being clear about how and why different types of evidence is used, however, helps to rule out those accounts that are not fit for purpose.

Would proponents of these accounts, including Reiss and Claveau, be convinced by this argument? On the one hand, Reiss might argue that looking at scientific practice might be misleading. Even if social scientists look for both the presence of a mechanism between the cause and the effect, and the presence of a difference-making relationship linking the cause to the effect, it does not follow that they use a single concept of causation. They might use multiple concepts, and there might be cases where they overlap, and others where they do not overlap. Claveau, on the other hand, could argue that the combination of evidence is only due the lack of high-quality difference-making evidence. Triangulation of difference-making and mechanistic evidence is therefore used to establish difference-making relationships.

Looking at how social scientists explore causation, however, would easily lead to a rejection of these counterarguments.

A case in point to reject Reiss' potential objection is the phenomenon of masking, which has been used by Reiss himself to argue that causal concepts do not overlap. Masking has been examined several times in the social sciences (Elster 1993; Steel 2008) and in general social scientists do not consider the claim "there is a mechanism linking X and Y" as sufficient to establish any kind of causation until the possibility of masking is ruled out. Social scientists want to recognise when counteracting mechanisms act together, they do not want merely to discern one of them (see Elster 1993, p. 2). This goal is clearly illustrated by the fact that one of the chapters of George and Bennet's book *Case Studies and Theory Development in the Social Sciences* was used to develop new strategies to study the complex interactions between different, contrasting mechanisms (George & Bennett, 2005, pp. 233–262).

The fact that social scientists want to recognise when a mechanism is masked is in accordance with the idea that evidence in favour of a mechanistic relationship should entitle scientists to believe in the presence of a difference-making relationship. To establish causation, social scientists want to know that the mechanism shown by their evidence is not masked, and that therefore the causal relationship is responsible for a difference-making relationship between the cause and the effect. The absence of a difference-making relationship associated with the mechanism under study would not lead social scientists to simply establish causation according to a mechanistic causal account, rather it would lead them to look for further counteracting mechanisms.

If we consider the objection Claveau might raise, finally, all the examples discussed so far clearly show that causation is not merely understood in terms of difference-making relationship. If that were the case, why would social scientists develop mechanistic approaches such as process tracing, instead of focusing all their energies on improving the ways in which difference-making evidence is collected?

6 Descriptive and normative RWT in the social sciences

Above I have provided some evidence in support of the claim that social scientists comply with RWT when establishing causation. However, RWT is not considered just a descriptive account. The normative dimension of the thesis is a crucial aspect that Russo and Williamson highlighted several times in their original article (2007), and that has been defended recently by Shan & Williamson (2021) when discussing

RWT in the social sciences. This dimension appears particularly relevant also in the social sciences, where social scientists are well aware of problems such as confounding, overfitting and masking (Clark & Golder, 2015; Elster 1993; George & Bennett 2005; Steel, 2008). Due to the presence of such problems in the social sciences, I argue that the normative form of RWT applies to causal social studies, and can provide a useful tool to help structure causal research and make sense of how evidence is used.

Like in the health sciences, RWT is capable of discriminating between strong and weak causal knowledge, and can guide social scientists in determining in which circumstances a particular causal claim is properly established. The combination of evidence to support the claim "there is a correlation between the cause and the effect", and evidence to support the claim "there is a mechanism linking the cause and the effect" reduces the possibility of bias that might lead to inferential mistakes and helps researchers to establish more reliable causal claims. It follows that the normative aspect of RWT, which characterises the logic of establishing causality, should be applied to the social sciences.

A final caveat should be added: RWT cannot guarantee success in all causal studies. Establishing causation is fallible, and collecting high-quality evidence can be challenging. Complying with RWT, however, can help social scientists reduce the likelihood of inferential mistakes and structure more clearly their efforts to establish causal claims.

7 Conclusion

If we look at how social phenomena are explored, it appears clear that social scientists do not look only for dependencies between variables of interest, but also for some evidence of mechanisms. Yet, this use of both difference-making and mechanistic evidence is not aimed at establishing different causal claims. Rather, as claimed by the Russo-Williamson thesis, social scientists use difference-making and mechanistic evidence to establish both a correlation between the cause and the effect, and the existence of a mechanism, linking the cause and the effect, responsible for such a difference-making relationship.

In this paper, I have described several causal studies in the social sciences that comply with RWT. I have then responded to the main criticisms concerning the application of RWT in the social sciences. To defend the descriptive form of RWT, I have argued that RWT is generally used successfully in the social sciences. To defend the normative form of RWT, I have shown that RWT is successful in establishing causal claims. My analysis of the objections proposed by Claveau and Reiss has also included some considerations on their accounts of causation. Such accounts have been explored in detail through Sects. 4 and 5, and I have concluded that they do not fit scientific practice, and that for this reason they should be rejected in favour of a causal account able to accommodate the current use of mechanistic and difference-making evidence in the social sciences. To conclude my defence of RWT, I have argued that social scientists should endorse RWT as this is not only consistent with

scientific practice, but also able to offer a clear structure to causal studies in the social sciences.

Declarations

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