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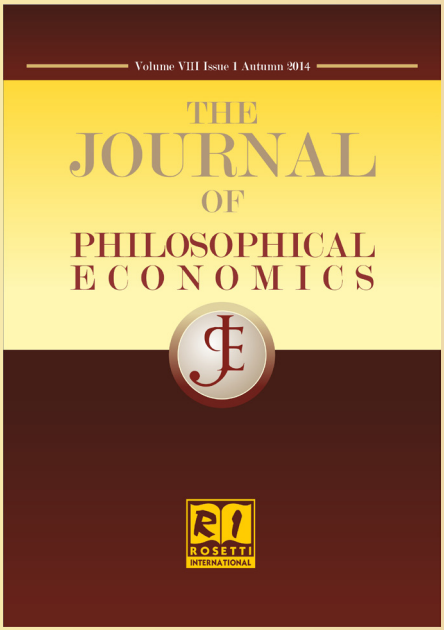

Social mechanisms and social causation

Friedel Weinert

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Abstract: The aim of this paper is to examine the notion of social mechanisms by comparison with the notions of evolutionary and physical mechanisms. It is argued that social mechanisms are based on trends, and not lawlike regularities, so that social mechanisms are different from mechanisms in the natural sciences. Taking as an example of social causation the abolition of the slave trade, this paper argues that social mechanisms should be incorporated in Weber's wider notion of adequate causation in order to achieve their explanatory purpose.

Keywords: ideal types, mechanisms (evolutionary, physical, social), natural selection, rainbows, regularities, slave trade, social causation, trends, Weber

> "The history of an idea from thought to action is (...) clearly more than one step" (Elkins 1976, p. 172)

Introduction

Recent discussions of causation in the social world have concentrated on the notion of mechanisms. The notion of a 'social mechanism' which brings about an event has a lot of similarity, according to some writers, with the notion of a physical mechanism in the natural world. It is held that the identification of an appropriate mechanism — either based on deterministic or statistical regularities (Bunge 1996, 1997, 2004; Hempel 1965, pp. 231-43; Papineau 1978) or causal powers (Bhaskar 1978; Manicas 2006) — , is conducive to obtaining a naturalist explanation in both the social and the physical world. This alliance seems to bring social scientific explanations much closer to explanations in the natural sciences, which has always been the aim of the naturalistic model of social sciences. Other writers, however, have cautioned that social mechanisms are not based on such structures,

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since they only express patterns, tendencies and trends, and allow for exceptions (Elster 1998, 2007; von Wright 1971, Ch. IV; Nagel 1961, Ch. 13). Nevertheless, in these approaches social mechanisms are important in attempts to causally explain happenings in the social world. Some typical mechanisms economic, psychological, or social— are the maximization of utility, the demand and supply mechanism, the avoidance of cognitive dissonance, mechanisms of social control, as well as belief-formation mechanisms like self-fulfilling prophecies.

But to which extent do social mechanisms explain social events? And what is the range of their explanatory power? Some authors argue that there are other aims in the social sciences, like prediction and understanding, which cannot be attained by appeal to mechanisms (Reiss 2007). A simple identification of causal mechanisms in the physical and social world neglects two important elements in social action: first, the role of statistical patterns, and second, the role of human agency. Any social mechanism will be based on trends and will be constituted by the mediation of minded persons (Manicas 2006, p. 2). In order to understand the role of social mechanisms this paper proposes to proceed by comparisons and contrast with physical mechanisms and evolutionary mechanisms. Each case will be based on a specific case study: the formation of rainbows illustrates the role of physical mechanisms in deterministic explanations; the coloration of male guppies will illustrate the role of evolutionary mechanisms, which support statistical explanations; finally the abolition of the slave trade (1807) will provide an illustration of social causation, in which human agency plays a major part. The upshot of this comparative analysis will be that social mechanisms are very different from both physical and evolutionary mechanisms, and yet will still allow the adoption of a position of weak naturalism in the social sciences.

Mechanisms in general

There has recently been a considerable amount of discussion regarding the nature of mechanisms. These discussions are placed within the 'systems tradition', which is an alternative to Hempel's DN and IS models of explanation (Hempel 1965; cf. Leuridan 2010). Even within the approach of mechanistic explanations, a distinction is drawn between etiological and constitutive explanations (Salmon 1984; Craver 2006). An etiological mechanistic explanation is a cause-effect relation, whereby a phenomenon (explanandum) is a consequent occurrence of an event or process or state, which can be traced to a set of antecedent causal conditions.

A constitutive mechanistic explanation explains a phenomenon by describing an underlying mechanism. The mechanism consists of component parts and their organized activities (Craver 2006, p.108fn). Much of the effort of the 'systems tradition' has concentrated on explaining the mechanisms in operation in biology and neuroscience.

For instance, Machamer *et al.* describe biological mechanisms as "composed of both *entities* (with their properties) and *activities*. Activities are products of change. Entities are the things that engage in activities" (Machamer *et al.* 2000, p. 13; italics in original). They stress that mechanisms work by the regular interaction between activities and entities (Machamer *et al.* 2000, pp. 4-6). Their characterization of mechanisms falls within the 'systems approach', since in a system the components are linked by regular interactions. Many scientists and philosophers concur that both the natural and social sciences are concerned with systems, so it seems appropriate to conceive of mechanisms in terms of *systems*. The components, which are needed to explain the formation of biological and physical phenomena, and the causal dimension of this explanation are well captured in the following definition of a mechanism:

> A mechanism for a behaviour is a complex system that produces that behaviour by the interaction of a number of parts, where the interactions between parts can be characterized by direct, invariant, change-relating generalizations (Glennan 2002, S344).

Craver also stresses that "mechanisms are entities and activities organized such that they exhibit the *explanandum phenomenon*" (Craver 2006, p. 6; italics in original). This is a preliminary sketch of a constitutive model and Craver spends much effort in refining this model to a normative account of constitutive explanations. In particular, he stresses that on his account mechanistic explanations need to satisfy a number of criteria, which include the importance of the notion of organization: "mechanisms involve the active, spatial and temporal organization of different components", and the importance of constitutive relevance: "both the mechanism and its components and activities must be relevant to the explanandum – they are mutually manipulable" (Craver 2006, pp. 161-2; Figure 1). More recent accounts emphasize the "interdependence among a mechanism's components", its' "jointness" (Fagan 2012). Let us now investigate how such a general notion of mechanism applies to the physical, biological, and social world respectively. We shall see that the types of 'interactions between parts' play a crucial role in the distinction between natural and social mechanisms.

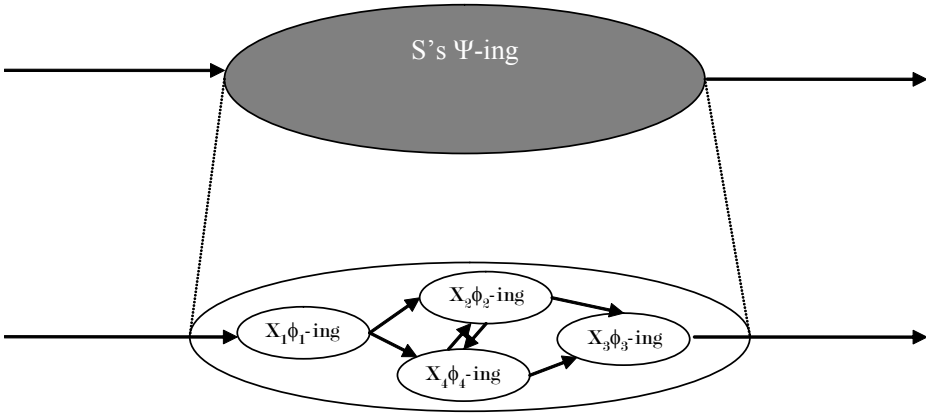


Figure 1: S's Ψ-ing is explained by the organization of entities $\{X_1, X_2...X_n\}$ and activities $\{\phi_1, \phi_2...\phi_n\}$. (Adapted from Craver 2006, p. 7)

Physical mechanisms

Consider the formation of rainbows as an example of a physical mechanism. Rainbows are the result of a combination of several processes: a) refraction of sunlight at the boundary between the air and the airborne water droplets, b) reflection of light in the interior of the drops, and c) interference of the refracted and reflected light beam. The angle of deviation, δ, differs for different 'colours' which make up sunlight. Observers see a rainbow on the opposite side of the sun in the sky, the antisolar point. When the sun is high in the sky, the curvature of the rainbow is small, but large when the sun is low in the sky. The highest curvature in the shape of a crescent is achieved at dawn and dusk, respectively. A rainbow can be modelled as a circle of angular radius θ and centred on the antisolar point (Figure 2). (Cf. Pincock 2011).

A primary bow has a radius of 42.5° and a width of 1.5° with respect to the antisolar point. It is caused by a combination of a double refraction and a single reflection of the light rays in a water drop. Dispersion then causes the widening of the ray with the sequence of colours from red, orange, yellow, green, blue, indigo and violet (from outside to inside) (Figure 3).

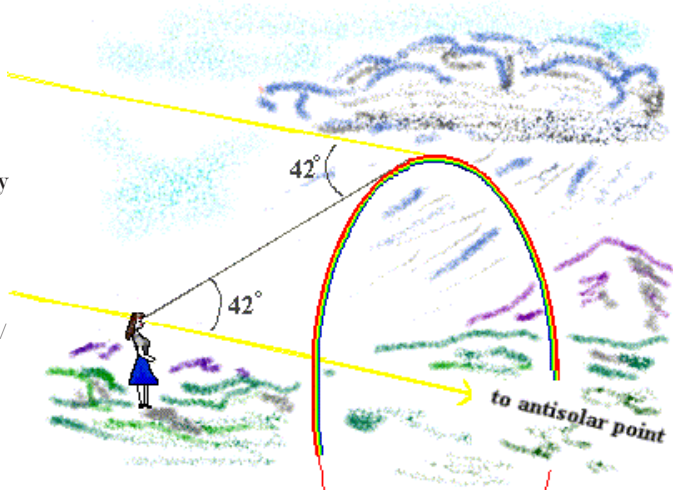


Figure 2: The antisolar point and radius of primary rainbow.

Source: The National Center for Atmospheric Research & the UCAR Office of Programs/ Education http://eo.ucar.edu/rainbows

The formation of a rainbow involves a purely physical mechanism, involving laws of refraction and reflection, and some boundary conditions, like the position of the sun in the sky and the source of the water vapour (rain, a fountain, or the bow of a ship). Such mechanisms have attracted much interest in the literature since they can be linked to the notion of causality.

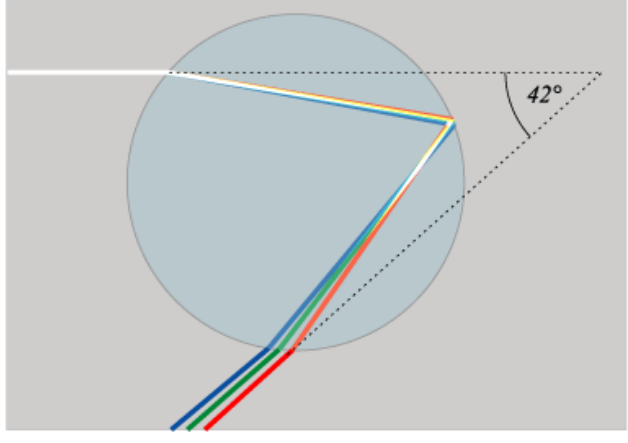
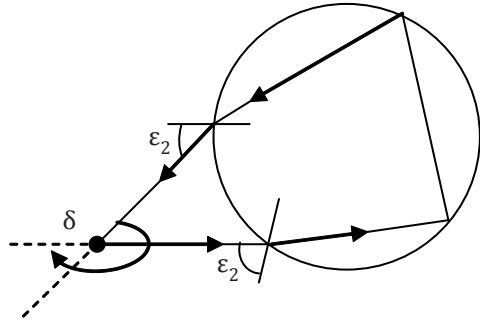


Figure 3: Double refraction and single reflection in a water drop, giving rise to a primary rainbow; $\delta = 42°$

Source: Wikimedia Commons

Figure 4: Sketch of the paths of rays in secondary rainbows, with double refraction and double reflection; δ = 52°

Source: Stöckler (2000, p. 323)



Let us consider how the above characterization of mechanisms fits this particular example. First, the mechanism, which produces a rainbow, forms a complex system: the system consists of a number of components (relata) and these components are made to interact through lawful regularities (relations). These interactions are invariant with respect to their space-time locations— rainbows form in the same manner irrespective of the place and time of their formation (but boundary conditions determine the curvature of the bow); and the interactions are 'variable-relating', which means that the relata can be treated as variables in the models such that an intervention on one variable brings about a regular and predictable change in another variable to which it is functionally related. For instance, the angle of deviation, δ, between the incoming and outgoing beams and for a m-fold reflection in the interior of the drop is:

$$\delta = 2(\varepsilon - \varepsilon') + (\pi - 2\varepsilon'),$$

(where ε is the angle of incidence and ε' the angle of refraction; Figure 4). Then a change in the quantifiable parameters— m, ε, ε' –will change δ from a primary to a secondary rainbow. Second, a number of relations can combine to produce the mechanism. This may happen in a linear fashion as in the current example, or in a vectorial fashion as in the causal explanation of planetary orbits in Newtonian physics, where the orbit is the vectorial sum of the first law of mechanics and the law of gravitation. Thus, in order to characterize a mechanism under the aspect of systems, we need a specification of the system components, the types of (lawlike) interactions between them and the specific boundary conditions, which specify the space-time location of the system. The definition could be narrowed down to mechanical macro-systems, in which case the relata are required to be observable macro-components and the relations between the variables are required to be

physically traceable and lawlike. For instance, the collision of two billiard balls or the switching of railway tracks are physically traceable to ordinary observers in a way that solar radiation is not. But it may be difficult to draw a line between 'traceable' and 'non-traceable' relations, and to specify the interactions in purely mechanical terms. Machamer *et al.*, whose focus is on biology, warn against thinking of mechanisms as "exclusively mechanical (push-pull) systems" (Machamer *et al.* 2000, p. 2).

Whilst in the formation of rainbows the invariant, variable-relating scientific laws are of a deterministic nature— and therefore constitute an example of constitutive mechanical explanation— this need not be the case, as a consideration of an evolutionary mechanism will show.

Evolutionary mechanisms

As is well known, Darwin's evolutionary theory is statistical in nature, which in Darwin's terms can be expressed by saying that features which are advantageous to survival tend to be preserved, whilst characteristics which are injurious tend to be eliminated. In contrast to a deterministic relation, a statistical relation therefore allows exceptions, where these exceptions do not constitute a violation of the statistical relation.

In Darwin's theory, natural selection is often treated as a mechanism, which consists of several components, and their interactions, extended in time (Cf. Garson 2013). Darwin accepted Malthus's view that food resources grew arithmetically whilst populations grew exponentially. Darwin did not understand the genetic mechanism of heredity, but he accepted the principle of hereditary, isotropic variations of offspring from their parents (population thinking). Darwin rejected the Lamarckian idea of use-inheritance, but he affirmed that among the offspring some will be born with favourable variations, other with injurious variations. Darwin also affirmed the principle of a constant struggle for survival. From these principles follows the statistical principle of natural selection: preservation of favourable variations and rejection of injurious variations, in a given environment. The evolutionary mechanism therefore unfolds over time, and yet, as the following example shows, involves an interaction of components parts.

An interesting experimental confirmation of the principle of natural selection appears in a study of the predator preference for brightly coloured male guppies (Godwin and McDonough 2003, pp. 194-200). The researchers used the guppy and

the blue acara cichlid fish as a model 'prey-predator system' to demonstrate, in a controlled experiment, that the predator cichlids tended to attack, on average, the more brightly coloured male guppies of equivalent size (in the ratio of 3:1). The researchers made sure that the preference of the predator for more colourful males was not due to other factors, like size or movement. On the other hand, colourful patterns are an advantage in the mating game, since females clearly prefer the most colourful males. The male guppy therefore faces a dilemma. In a predator-free environment, the brightly coloured male has a better chance of mating success than the drabber male, but in a predator-rich environment the brighter-coloured males run a greater risk of mortality from predation. On the principle of natural selection one would expect a statistically significant inverse relationship between colouration and high predation. This relationship has been experimentally confirmed (Endler 1980). When predators are introduced into guppy populations which had a weak predation intensity, the number and size of colour patches in adult male guppies gradually reduced over a few generations; when male guppies were transferred from a high-predation site into a low-predation population, the number and size of colour patches in males increased over a few generations.

There exists, therefore, a significant statistical correlation between predation intensity and colouration; furthermore, the colouration of male guppies corresponds to varying levels of predation-intensity. Although statistical in nature, the evolutionary mechanism still allows the prediction of evolutionary phenomena, as the guppy experiment shows. It is an example of an etiological mechanistic explanation. The question now arises how these two types of mechanisms (deterministic and statistical) compare to social mechanisms.

Social mechanisms

There are many definitions of social mechanisms (Gross 2009, pp. 359-66; Reiss 2007). Yet despite some differences between them, there are a fair number of similarities: the link between cause and effect in context-specific situations, and varying degrees of generality of mechanisms. A standard view in the philosophy of social sciences is that a mechanism in the social sciences is to be understood as a pattern of behaviour, which is invoked to account for some observable change in the social world. A pattern can be understood as an arrangement of corresponding parts, held together by some underlying regularity. But patterns of behaviour also make reference to social agents, who intentionally engage in such behaviour with other agents. A pattern can explain change so that a social mechanism, as a pattern

of behaviour, has causal force. According to Jon Elster, social mechanisms are to be understood as "frequently occurring and easily recognizable causal patterns that are triggered under generally unknown conditions or with indeterminate consequences" (Elster 2007, p. 36). They allow us to predict the general direction of social events, but not the magnitude of their change. Mario Bunge points out that there are many social mechanisms because there are many social systems. Bunge suggests the following formal definition:

> We define a social mechanism as a mechanism in a social system. Since every mechanism is a process in some system, a social mechanism is a process involving at least two agents engaged in forming, maintaining, transforming, or dismantling a social system (Bunge 1997, p. 447).

Thomas Schelling suggests two possible characterizations of social mechanisms. Under the systems aspect he defines a

> social mechanism (as) a plausible hypothesis, or set of plausible hypotheses, that could be the explanation of some social phenomenon, the explanation being in terms of interactions between individuals and other individuals, or between individuals and some social aggregate [...]

The second characterization puts more emphasis on social agency:

> Alternatively, a social mechanism is an *interpretation*, in terms of individual behaviour, of a model that abstractly reproduces the phenomenon that needs explaining" (Schelling 1998, pp. 32-3; italics in original).

As can be seen from the examples and the definitions, a social mechanism need not be 'mechanical'. But Bunge, in opposition to Elster and Schelling, sees close similarities between physical and social mechanisms, between natural and social science and holds that

> the only condition for a mechanism hypothesis to be taken seriously in modern science or technology is that it be concrete (rather than immaterial), lawful (rather than miraculous), and scrutable (rather than occult)" (Bunge 1996, p. 138).

These definitions emphasize that social mechanisms apply to social systems, which have component parts (individuals, aggregates) between which some interactions take place, within a certain environment. Yet other definitions of social mechanisms, as indicated by Schelling, put the emphasis much more on social agents and their actions than on social systems. For instance, Neil Gross proposes a pragmatist theory of mechanisms, according to which

> social mechanisms (are) composed of chains or aggregations of actors confronting problem situations and mobilizing more or less habitual responses (Gross 2009, p. 368; cf. Manicas 2006, p. 2).

Gross claims that a pragmatist definition has certain advantages over more systems-based characterizations for the purpose of sociological explanations, because it views social mechanisms from the point of view of social actors. However, his definition does not radically change the philosophical perspective on social mechanisms. They are still seen as relations between actors, the problem-situations they attempt to solve, their habitual responses, which "in aggregate or sequentially bring about the I-O (input-output) relationship" (Gross 2009, p. 368). In particular, the reference to 'habitual responses' to problem situations suggests a certain degree of regularity, and a choice of pre-existing patterns, which individual social actors adopt. For instance, self-fulfilling prophecies can be viewed from the point of view of social actors as an enactment of pre-existing patterns of behaviour, which are available as belief-formation mechanisms, whether or not individual actors decide to embrace them.

Although all agree that social mechanisms are context-specific, there are still sufficient similarities between social events to construct models of social mechanisms, which highlight the salient features of real mechanisms at work in the social world (Bunge 1997, p. 451; Stinchcombe 1991, pp. 375-6; cf. Sawyer 2004). The further question whether social mechanisms are empirically observable or are simply model assumptions, does not arise if we adopt Max Weber's methodology of ideal types. The envisaged models of social mechanisms are *as-if* models or hypothetical models because they model social reality *as-if* it existed only of the components of the model mechanism. For reasons which will become clearer later, it is important to remember that Weber's ideal type methodology is very close to this understanding of models of social mechanisms, since Weber's ideal types can also be characterized as hypothetical or *as-if* models (Weinert 1996). It lies in the nature of models that they are able to model systems, which consist precisely of relata and their relations. As Weber emphasizes, however, such ideal-typical models must be subject to empirical tests. Ideal-typical models of social mechanisms can be thought of as idealizations of real mechanisms in the social world.

At this stage two questions arise: 1) If social mechanisms are akin to mechanisms in the natural sciences, as some authors claim (e.g. Bunge, Hempel), what is the precise nature of these mechanisms, given that they always involve human agency? In order to tackle this issue, we first have to address the question of the type of regularities which are operative in social mechanisms and whether they are similar

or dissimilar to regularities underlying biological and physical mechanisms. We shall assume that both natural and social systems can be modelled as structures, consisting of relata and their relations. If there is a difference between natural and social mechanisms, it boils down to the question of whether interactions between social entities are based on lawful regularities in the same way as in natural mechanisms. This focus on patterns of interaction is justified because all the definitions considered above emphasize the importance of interactions between relata, whether the relata are biological entities, physical parameters, or social agents.

2) Even though human agency plays a constitutive role in social mechanisms (Manicas 2006, p. 2), social mechanisms have explanatory functions, since they are seen as hypothetical causal patterns of behaviour. It will then be interesting to ask how social mechanisms can explain events in history, in which ideas and agency played a causal part. For instance, for two centuries a general assumption prevailed in the Western world, say from 1550 to 1750, that the enslavement of people, in particular Africans, was a normal type of behaviour, justifiable by both economic and religious reasons. Yet a current of Enlightenment ideas developed, which eventually led to the passing of the anti-slave trading law in Britain (1807), which rendered the British arm of the slave trade illegal— although it did not stop the practice of slave-trading for many years to come. This suggests that ideas played a causal role in the abolition movement. The role of ideas in history has been particularly stressed by Weber. According to Weber (1948), ideas have the power to channel social action. Weber also developed a model of social causation.

Mechanisms and general trends

This section will first argue that the underlying regularities at work in social mechanisms are logically distinct from regularities in natural mechanisms, so that we have to conclude that social mechanisms are logically distinct from natural mechanisms. And it will consider how social mechanisms can accommodate ideas and human agency. What effect does this have on the nature of social mechanisms? The abolition of the slave trade, as a case study in social causation, will highlight some particular features of social mechanisms.

Mechanisms and regularities

According to Elster, mechanisms are "triggered under generally unknown conditions or with indeterminate consequences" (Ester 2007, p.36). Bunge characterizes the structure of social science explanations as consisting of a testable mechanismic hypothesis or theory, as well as value judgements and norms and circumstances, which together explain the explanandum (Bunge 1997, p. 443; Bunge 1996, p. 143). Although Bunge insists that mechanisms are inconceivable without laws, he concedes that

> in the social sciences, law and mechanism are necessary but insufficient to explain, because almost everything social is made rather than found. Indeed, social facts are not only law-abiding but also norm-abiding; and social norms, though consistent with the laws of nature, are not reducible to these, if only because norms are invented in the light of valuations— besides which every norm is tempered by a counternorm (Bunge 2004, p. 197).

The appeal to patterns of behaviour in the social world obviously refers to some kind of regularity, without which such patterns would be inconceivable. It is the nature of these regularities, which ultimately decides whether or not social mechanisms can be assimilated to natural mechanisms, because in mechanisms relata are held together by various types of interactions. It is the type of interaction, which determines which relata enter the system. As it turns out, Bunge's concession of the impact of human agency will have serious consequences for any attempt to assimilate social regularities with 'laws' in the sense of the natural sciences, either in a deterministic or statistical sense. As Bunge emphasizes, there are no universal mechanisms known to the social sciences; rather social mechanisms are context-specific. But this recognition immediately implies that social mechanisms are variable and subject to change either due to accidental features or deliberate human intervention. But if social mechanisms are variable and subject to change, so must be the underlying social regularities. In physical mechanisms, the lawful regularities are invariant with respect to a change of the relata, as long as their validity remains within the appropriate domain of application. The physics of tennis remains the same whether the players are amateurs or professionals, whether the game is played in Andalusia or Zimbabwe. Biological mechanisms are based on statistical regularities, but these statistical regularities are still invariant with respect to a change of relata, and give rise to predictions. In social systems the regularity may not be invariant with respect to a change of relata; social patterns

change between different cultures and communities. This aspect is particularly emphasized by the pragmatist approach to social mechanisms.

These features constitute two significant departures from natural laws, either deterministic or statistical. 1) While humans can observe physical laws and employ them for the purpose of intervention in physical systems, neither the observation nor the intervention will change the regularity itself. But social regularities can both be modified and be reversed as a result of deliberate human intervention. Thus, they exhibit the characteristics of trends, rather than genuine laws (Weinert 1997; cf. Nagel 1961, pp. 451, 466-8). 2) Social mechanisms are context-specific in a dual way: They can either be modified by changing the component parts (relata) or by changing the underlying trend (relation). In each case they are dependent on particular circumstances (norms and values change); thus, changing a social mechanism and changing a trend requires knowledge of social conditions. But dependence on initial conditions is the logical characteristic of trends. Trends are simply inductive generalizations from a number of initial conditions. Trends are descriptive of a large number of cases, which allow for genuine exceptions. Logically, trends are dependent on initial conditions in a way that genuine laws are not (Popper 1957). An indicator of this dependence is that a change in initial conditions— like a change in value systems or a change in legislation— will change the very nature of the social pattern. In order to achieve this reversal or modification, the initial conditions, which trigger the social mechanism, must be known.

This dual aspect of trends has an effect on the nature of social causation: we need to consider a cluster of conditions, including initial conditions, human agency, and social mechanisms when we consider a case of social causation. Hence there exists a much tighter connection between social mechanisms and 'circumstances' than for mechanisms in the natural world. A natural mechanism is typically governed by lawful regularities, which are stated without initial conditions, since the mechanism holds in their absence. The initial conditions only instantiate the lawful mechanisms. We saw this at work in the description of the formation of rainbows [1].

Social mechanisms must therefore be logically distinct from mechanisms in the physical and biological sciences because they are based on trends (or trend-like patterns) rather than lawful regularities between quantifiable parameters, and they depend on human agency. The question now arises whether social mechanisms are sufficient to explain a significant social event, like the abolition of the slave trade.

The abolition of the slave trade [2]

Which events caused the abolition of the slave trade? There can hardly be any doubt that the abolition of the slave trade in Britain in 1807 must be regarded as an effect of some antecedent causal conditions, since what had been regarded as the 'normal running of things' became an abnormality. According to the above-mentioned account we should therefore be able to identify some social mechanism, which can explain the effect. However, what we find in the literature on the slave trade is a cluster of conditions, which historians regard as the most adequate conditions. They are considered to have the explanatory power to explain the effect. But historians often disagree on which particular conditions should be regarded as causally effective in bringing about the abolition. The cluster of conditions, which can be found in the literature, can be summarized as follows:

- *Economic conditions*. Anti-abolitionists often stressed the importance of the slave trade for the economic prosperity of Britain. It is certainly the case that individual traders became wealthy from the slave trade and that cities like Bristol, Liverpool, and London prospered. For instance, the Duke of Clarence— son of King George III— declared in the House of Lords (1799) "that the present British Capital in the West Indies, is equal, upon a fair calculation, to ONE HUNDRED MILLION STERLING! A sum, my Lords, which demands your most serious consideration, before you consent to the Abolition of that Trade without which it could not exist" (quoted in Pinfold 2007, p. 365; capital letters in original). However, pro-abolitionists often pointed out that the economic benefits of the slave trade were exaggerated. According to contemporary and modern calculations, the slave trade was never particularly profitable, since the average profit margin on the trade was not greater than 9% at any one time (Ansty 1975, Ch. 2; Davis 1966). The 'unprofitability' of the trade was highlighted by contemporary pro-abolitionists when they pointed out
  - that the price of African slaves rose steadily in the 18th century;
  - that tobacco and sugar would be cheaper to produce if either the plantation owners employed free labour (a point repeated by Adam Smith) or if plantations were established on African soil.

Today's historians seem to have come to a consensus that the slave trade was not abandoned for purely economic reasons. It should be stressed that this reassessment of the likelihood of antecedent conditions occurred on the strength of evidence in terms of historical records (Fogel & Engerman 1989).

- *Religious reasons*. Quakers, like John W. Wesley, became an essential source of anti-slavery sentiments (Reddie 2007). In the past, the concept of original sin had been used to justify slavery and the domination of one race over the other.

> The essence of sin and slavery was a denial of self-sovereignty, a negation of the natural ability to will that which was just and lawful. All men were condemned by Adam's sin to sweat for their bread; and some men were required [...] to sweat more than others. Sin and the necessities of Providence qualified the belief in the equality of men before God, and sanctioned the enslavement and transportation to America of millions of Africans (Davis 1966, p. 292; cf. Elkins 1976, pp. 34-5).

Slavery was often justified by an evocation of biblical stories like Noah's curse [3]. But a change in the meaning of the concept of sin, and an emphasis on human freedom and human responsibility towards history, which marked the Enlightenment period, was bound to have an effect on attitudes towards slavery.

> Since sin was traditionally thought of as a kind of slavery, and external bondage was justified as a product of sin, any change in the meaning of sin would be likely to affect attitudes toward slavery (Davis 1966, p. 292).

This change occurred:

> In the eyes of the more radical millenarians, the universe was suddenly transformed from a fixed hierarchy of moral gradations into an irreconcilable division of evil and righteousness, of darkness and light, of freedom and slavery (Davis 1966, p. 297).

And it had its own logic:

> (The) inner logic of Quakerism (...) stemmed from the basic proposition that Christ died for all men, so postulating a fundamental equality between them, and from the call to Quakers to love all men (Ansty 1975, p. 203).

- *Enlightenment reasons*. Quakerism appeals to values, which took on great significance in the Enlightenment period. In the eyes of modern historians of the slave trade, the Enlightenment period was crucial because it promoted secular ideas of liberty, of freedom from suppression and unjustified doctrines of supremacy, as well as the natural rights doctrine which helped to create a new image of humanity. Kant expressed this new attitude in his famous motto of the Enlightenment: *sapere aude*. In Max Weber's terminology, the Enlightenment ideas helped channel social action in the direction of ending

> the slave trade. It is not the case that *all* Enlightenment thinkers condemned the slave trade. And early complaints about the viciousness of the slave trade reach as far back as the 16th century (Las Casas, 1542) and continued throughout the 17th century (A. Vieira, 1660; J. B. Du Tertre, 1667). But the opposition of famous intellectuals like J. J. Rousseau, Ch. Montesquieu, G. Raynal, A. Condorcet, F. Hutcheson and A. Smith provided an important impetus to a change in mental attitudes. This change was very much a grassroots affair with ordinary people signing literally thousands of petitions and 'boycotting' the sale of sugar and other plantation goods.

It is important to stress that this cluster of conditions could be used in favour as well as against the slave trade. For instance, the Bible could be used to justify the existence of the slave trade [4] Equally humanitarian reasons were often used to condone the slave trade. It was said by anti-abolitionists that Africans met better living conditions in the colonies than at home, and that the trade should be continued, as the Duke of Clarence argued in Parliament, "for the sake of humanity" (quoted in Pinfold 2007, p. 346; cf. Elkins 1976, pp. 193-222).

This illustrates the indeterminate consequences of which Elster speaks. The emphasis on Enlightenment ideas stresses the role of ideas and agency in the change of events and illustrates Weber's thesis that while ideas do not determine social events they have the power to channel these events into certain directions.

> Not ideas, but material and ideal interests, directly govern men's conduct. Yet very frequently the 'world images' that have been created by 'ideas' have, like switchmen, determined the tracks along which acting has been pushed by the dynamic of interest. 'From what' and 'for what' one wished to be redeemed and, let us not forget, 'could be' redeemed, depended upon one's image of the world" (Weber 1948, p. 280; cf. Elkins 1976, pp. 170-5).

Nevertheless this set of conditions— especially religious and Enlightenment attitudes more than economic considerations— may be regarded as *necessary* for the change of attitudes, which occurred in the 18th century, but not as *sufficient* for the abolition of the British arm of the slave trade. The change in ideas about human nature was a necessary condition, which channelled the pro-abolitionist movement towards abolition. But the translation of ideas into social action requires certain social mechanisms. The parliamentary procedures prior to 1807 may be regarded as the social mechanism which provided the sufficient condition for a change in legislation in Britain. By parliamentary procedures is meant the extended process through which the pro-abolitionists gained a majority vote for the abolition bill.

This includes the grassroots movements against the slave trade, such as consumer boycotts of tea and tobacco, and thousands of petitions sent to parliament by ordinary people. What happens when appropriate mechanisms are missing has been studied in the case of American abolitionism. According to a student of the abolition movement in the US, the American anti-slavery movement in the 1830s suffered precisely from a lack of plausible mechanisms, which were capable of converting feelings of guilt and moral repugnance into concrete social reform (Elkins 1976, pp. 170-93). How, then, are Enlightenment ideals and mental attitudes to be included in social mechanisms? For ideas to become vehicles of social action they need some form of institutionalization or pattern; in the language of social action theory, they need to instigate a chain of aggregate behaviour and habitual responses in the face of a problem situation. As M. Weber and St. Elkins have shown, ideas as such are powerless; they only channel social action into particular directions, but they rely on the existence or formation of patterns in order to become effective. In the current example, Enlightenment ideas were the initial conditions on which social mechanisms depended for input.

The role of parliamentary procedures in the abolition of the slave trade suggests a refinement of the role of trends in social mechanisms. Parliamentary procedures are fairly reliable and regular processes, which are more stable than normal societal trends. Trends, therefore, come in degrees of stability. Political procedures are often stable, reliable patterns of social action. However, the logical point about trends remains: even stable patterns of human action are reliant on initial conditions and susceptible to reversibility, in a way that laws of nature are not.

The Enlightenment ideas can then be regarded as necessary conditions. Necessary conditions are normally regarded as conditions in the *absence* of which some consequent event cannot occur. For instance in the absence of oxygen no fire can break out. But the presence of oxygen does not mean that a fire will occur because more conditions will need to be present for a fire to start. This situation seems to have obtained in the United States in the 1830s. A sufficient condition is normally understood as one in the *presence* of which some subsequent event will occur. For instance, in the presence of rain the streets will get wet. But rain is not a necessary condition since a broken water pipe will also wet the streets. Recall from the above definitions that social mechanisms are seen as concrete processes between interacting social entities, which have the power to bring about change. Applied to the slave trade, we observe the linkage between social mechanisms and initial conditions, which characterizes the trends underlying

social mechanisms: the abolitionist cause would be unthinkable without the prior change in mentality. The Enlightenment ideas which inspired the abolitionists constituted the initial conditions under which they employed the parliamentary machinery. The Enlightenment ideas were instrumental in specifying the aim of their parliamentary attempts to obtain a bill, which would end the British arm of the slave trade. But without parliamentary procedures, abolition may not have taken place, as the situation in the US in the 1830s confirms. Thus, as Max Weber saw, we need to consider the cluster of necessary and sufficient conditions to causally understand a social event, like the abolition of the slave trade. As Stinchcombe writes, "theories of mechanisms at the individual or situational level in social science may be of no use outside boundary conditions" (Stinchcombe 1991, p. 385). That is to say, social mechanisms model patterns of behaviour under conditions of idealizations. The boundary conditions supply the concrete data under which the abstract mechanism must operate in order to explain concrete events. As Stinchcombe suggests, social mechanisms are a "subtype of models" (Stinchcombe 1991, p. 376; cf. Bunge 1997; Hedström and Swedberg 1998, pp. 15-6). They involve degrees of approximation and explain aggregate types of behaviour. The models explain aggregate behaviour *as if* the model consisted only of the components and their relations as represented in the model. In other words, social mechanisms can be understood as ideal-typical models, in Weber's terminology, since they specify a set of conditions under which they hold on aggregate.

What the consideration of the abolition of the slave trade suggests is that etiological and constitutive explanation must be linked, for the Enlightenment ideas channelled social action into a particular direction, but a political mechanism was needed to turn the ideas into law. In Weber's discussion of causation in the social sciences there is no strict distinction between social mechanisms and initial conditions. In Weber's terms a set of such conditions constitutes the most probable conditions under which the explanandum occurred. If the explanandum is the abolition of the slave trade, then the cluster of religious and philosophical ideas—generally the ideals of the Enlightenment— which occurred prior to 1807, and the political procedures to turn ideas into action, are the most likely conditions to account for the explanandum. Once such a set of conditions is identified, we have an adequate causal explanation of the event, *E*. Weber speaks of 'adequate' causation because he is aware that causal explanations in the social sciences do not take the strict form they take in the physical sciences. Yet he insists that "it is possible to determine, even in the field of history, with a certain degree of certainty which conditions are more likely to bring about an effect than others" (Weber 1949,

p. 183). In Weber's model of adequate causation the social mechanisms are only part of the set of antecedent conditions, which are the most likely determinant conditions for some given social event, *E*. Furthermore, as we have seen, Weber's model does not require that the mechanisms are based on some lawful, say statistical, regularities.

Mechanisms can be based on deterministic relations, statistical regularities, or social trends. As these constitute degrees of regularity, both the explanation of phenomena and their prediction are possible. Even trends in the social world are stable enough to give rise to a limited predictability and explanation of human behaviour. Thus, although social mechanisms are logically weaker than natural mechanisms, they are strong enough to support a weak naturalism in the social sciences.

Conclusion

On Weber's model of adequate causation, then, the abolition of the British arm of the slave trade occurred because new ideas about humanity began to change the perception of slave trading. While Enlightenment ideas channelled social attitudes to the slave trade into a particular direction, the pro-abolitionists needed to turn this humanist direction of thinking into concrete political action, which required the employment of appropriate parliamentary procedures. Of course, this combination of antecedent conditions did not necessitate the outcome. But given the outcome— the abolition of the British arm of the slave trade (1807)— the antecedent conditions (Enlightenment ideas and parliamentary procedures) are the most likely conditions which adequately explain the abolition of the slave trade. In the case at hand, the causal patterns were not triggered under 'unknown' conditions and the consequences were probable rather than merely indeterminate. These considerations suggest that a social mechanism cannot be employed without knowledge of the antecedent boundary conditions, under which it is supposed to occur. This result is due to the fact that social mechanisms are based on patterns, trends, and human agency, rather than lawful regularities, as in natural mechanisms. Although both social and natural mechanisms can be modelled as systems, which consist of relata and their relations, their decisive difference resides in the logical status of the underlying regularities, which bind the relata together. Social mechanisms are based on patterns of variable degrees of stability, which are reversible and inductively generalized from initial conditions. Physical and biological mechanisms are based on laws of nature, which only require initial conditions for their

instantiation. Social mechanisms are therefore logically distinct from physical mechanisms. It is therefore social mechanisms, and more generally a cluster of necessary and sufficient conditions, which must explain causation between social events.

Endnotes

[1] Mechanisms are employed in many sciences and many discussions concentrate on mechanisms in the biological sciences. Although biological laws are often statistical in nature, and possibly much more 'local'— restricted to certain parts of the solar system— than physical laws, they too cannot be reversed by human intervention or otherwise. The distinction between initial conditions and laws also holds for biological laws (cf. Sober 2008, p. 363). When we speak of a cluster of (antecedent and subsequent) conditions, in a causal context, we have Weber's model of causal causation in mind; for further discussion see Weber (1949) and Weinert (2007).

[2] Although it is convenient to speak of the 'abolition' of the slave trade, historical accuracy demands to point out that Britain did not abolish the slave trade. Rather, Britain declared the British arm of the slave trade illegal under British law. The slave trade continued until the middle of the 19th century. Nor was Britain the first country to ban the slave trade. Portugal, the original superpower of the slave trade, abolished it in 1761. Revolutionary France also declared the French slave trade illegal (1794), only to reintroduce it under Napoleon. However, as Britain was a world power at that time, the 'abolition' of 1807 was a significant act with vast symbolic implications.

[3] The view was that Blacks were descendants of Ham, who had had the misfortune of seeing his father, Noah, naked. Noah condemned the sons of Ham to perpetual bondage (Blackburn 1989, p. 35).

[4] In 1788 a certain Raymund Harris of Liverpool published his *Scriptural Researches on the Licitness of the Slave Trade, Shewing its Conformity with the Principles of Natural and Revealed Religion* (Pinfold 2007, pp. 175-248).

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