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Abduction, Deduction and Induction in Qualitative Research

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1. Abduction – a Rule-governed Way to New Knowledge?
2. Deduction, Quantitative and Qualitative Induction, Abduction
3. Two Strategies for Producing Abductions
4. Research Results - Reconstruction or Construct?

1. Abduction – a Rule-governed Way to New Knowledge

Social researchers who take an interest in the fluctuation of their own professional vocabulary have been able, for more than a decade, to witness the flourishing of a concept which is around 400 years old: it is a matter of the term *abduction*. The boom has been so vast that we sometimes hear talk of an 'abductive turn' (Bonfantini 1988, Wirth 1995).

First introduced in 1597 by Julius Pacius to translate the Aristotelian *apagoge*, abduction remained quite unnoticed for almost three centuries. It was C. S. Peirce (1839 – 1914) who first took it up and used it to denote the only truly *knowledge-extending* means of inferencing (so he claimed) that would be categorially distinct from the normal types of logical conclusion, namely *deduction* and *induction* (1976, 1986, 1973, 1992). But several decades were to pass before Peirce's ideas were systematically received and also adopted (Anderson 1995, Apel 1967, Fann 1970, Hanson 1965, Moore & Robin 1964, Reichertz 1991b, Tursman 1987, Wartenburg 1971).

Today the term 'abduction' has become something of a password within social research (but not only there): educationists, linguists, psychologists, psychoanalysts, semioticists, theatre-scientists, theologians, criminologists, researchers in artificial

intelligence and of course also sociologists announce in their research reports that their new discoveries are due to abduction.

The great success of abduction, in my opinion, may be traced back to two particular features: firstly to its indefiniteness and secondly to the misjudgement of the achievements of abductions that derive from this. For frequently the use of the idea of abduction has led in many of its users to one particular hope, that of a *rule-governed* and *replicable* production of new and *valid* knowledge. This hope is found, above all, in artificial intelligence research and in a number of variants of qualitative social research (see **2.1**).

All these approaches have in common that they stress both the *logical* and also the *innovative* character of abduction. For abduction is no longer treated as a traditional, classical means of drawing conclusions, but as a new method that is not yet incorporated into formal logic. However, it is, in every sense, a means of inferencing. It is precisely in this quality of being a 'means-of-inferencing' that we find the secret charm of abduction. On the one hand it is a *logical* inference (and thereby reasonable and scientific), and on the other hand it extends into the realm of profound insight (and therefore generates new knowledge). This sort of concept of abduction associates its critics with a kind of positivism capable only of tautology, in the hope of a new kind of social research which will see sociality more reasonably and therefore better. Abduction is intended to help social research, or rather social researchers, to be able to make new discoveries in a logically and methodologically ordered way.

This hope is directed against Reichenbach (1938) and Popper (1934), who, by separating the logic of discovery from the logic of justification, 'drove' the first into the realm of psychology, and allowed only the second into the realm of serious science. This separation should be reversed: the unfortunate disjunction of contexts of discovery and justification should be removed by means of abduction. A rethinking of this kind promises a great deal:

liberation from the 'chance of a good idea' (Habermas 1971: 147), and (it is hope) 'synthetic inferences *a posteriori*' (cf. Oevermann 1987).

Because of this hope many social scientists have treated, and still do threat, abduction as a magic formula – always applicable when the cognitive basis of the process of scientific interpretation is being investigated. In my opinion, however, this hope is the result of a widespread misunderstanding of Peirce's position, namely the misunderstanding that there are no differences between 'hypothesis' and 'abduction' as forms of inference. From the modern point of view it is beyond question that up to about 1898 Peirce combined *two* very different forms of inference under the name of 'hypothesis'. When he became aware of this unclear use of the term 'hypothesis', he elaborated a clear distinction in his later philosophy between the two procedures, and called the one operation 'qualitative induction' and the other 'abduction' (for more detail see Reichertz 1991b, and also Eco 1981).

Many social scientists, with reference to the *achievements* of abduction, rely on Peirce's later work (in my view wrongly), but with reference to its *form* and *validity*, on his work on hypothesis. It is only on the basis of this 'hybrid meaning' that they succeed in designing a logical operation which produces new knowledge in a rule-governed way.

2. Deduction, Quantitative and Qualitative Induction, Abduction

The social order on which humans (often but not always) orient themselves in their actions is constantly changing and is, moreover, 'sub-culturally fragmented'. The different order(s) therefore possess only a localized validity and are continually, and – since the advent of the 'modern' – with increasing rapidity, being changed by these human beings who previously (up to a point) adhered to them. Moreover, it is a fact that both the *form* and the *validity* of this order are bound to the meaning attributions and interpretations of the acting subjects. Social science explanations of actions aim at the (re-)construction of the order that is relevant

to the acting subjects. Admittedly this kind of order can no longer be derived from proven grand theories, firstly because these are, as a rule, not sufficiently 'local', and secondly because they have frequently already been overtaken by constant social change. Because this is the case, 'fitting' new views of the make-up of social order must constantly be generated. For this reason it is highly sensible to examine as closely as possible the life practice that is to be understood, and – on the basis of these data – to (re-)construct the *new* orders.

If we are now to make a serious attempt, in (qualitative and quantitative) research, to evaluate collected data, in other words to typologize them according to particular features and orders of features, the question very soon arises of how we may bring a little order in the chaos of the data. This is only to a very small extent a matter of work organization (sorting of data) and much more a question of how the unmanageable variety of the data may be related to theories – either pre-existing or still to be discovered.

In this undertaking (if one pursues the ideas of Peirce) we may, in ideal terms, distinguish *three* procedures, and in what follows I shall subdivide the second procedure into two sub-groups – but not because there are fundamental differences between the two, but rather because in this way the difference we have already spoken of between *abduction* and *hypothesis* or *qualitative induction* can be made clearer (for fuller discussion of this see Reichertz 1991b).

1. One type of data analysis consists of the procedure of *subsumption*. Subsumption proceeds from an already known context of features, that is from a familiar *rule*. (e.g. all burglars who steal from a medicine chest are drug addicts), and seeks to find this general context in the data (e.g. the unknown burglar has robbed the medicine chest) in order to obtain knowledge about the individual case (e.g. the unknown burglar is a drug addict).

The logical form of this intellectual operation is that of *deduction*: the single case in question is subordinated to an already known rule. Here a tried and trusted order is applied to the new

case. New facts (concerning the ordering of the world) are not experienced in this way – merely that the unknown burglar is a drug addict (knowledge that may be quite useful to the police – if the rule is true). Deductions are therefore *tautological*, they tell us nothing new. But deductions are not only tautological but also *truth-conveying*: if the rule offered for application is valid, then the result of the application of the rule is also valid.

2.1. A second form of analysis consists of extending, or *generalizing*, into an order or rule the combinations of features that are found in the data material. Proceeding from the observation that 'in the case of burglaries a, b and c the medicine chest was robbed'; and the case-knowledge that 'Mr. Jones committed burglaries a, b and c, the inference is drawn that 'Mr. Jones always robs the medicine chest when he breaks in'. The logical form of this intellectual operation is that of *quantitative induction*. It transfers the quantitative properties of a *sample* to a totality, it 'extends' the single case into a rule. *Quantitative inductions* therefore (strictly speaking) are equally tautological but not truth-conveying. The results of this form of inferencing are merely *probable*.

2.2. One particular variant of the inductive processing of data consists of assembling certain qualitative features of the investigated sample in such a way that this combination of features resembles another (that is already available in the repertoire of knowledge of the interacting community) in essential points. In this case one can use the term that already exists for this combination to characterize one's 'own' form. The logical form of this operation is that of *qualitative induction*. From the existence of certain qualitative features in a *sample* it infers the presence of other features (e.g. At the scene of a crime I see a particular set of clues. In very many respects these agree with the pattern of clues of Mr. Jones. Conclusion: Jones is responsible for the clues). The observed case (*token*) is an instance of a known order (*type*).

In brief: if *quantitative induction* makes inferences about a totality from the quantitative properties of a *sample*, qualitative induction – in contrasts – supplements the observed features of a sample with others, that are not perceived. It is only in this sense that this form of induction transcends the borders of experience – that is, only the experience of the sample in question. This inference only extends knowledge to the extent that it proceeds from a limited selection to a larger totality. *Qualitative induction* is not a valid but only a probable form of inference – although it does have the advantage of being capable of operationalization (albeit with difficulty). Qualitative induction is the basis of all scientific procedures that find, in collected data, only new versions of what is already known.

3. The third type of data processing (apparently similar, but in fact totally different) consists of assembling or discovering, on the basis of an interpretation of collected data, such combinations of features for which there is no appropriate explanation or rule in the store of knowledge that already exists. This causes surprise. Real surprise causes a genuine shock (and not only in Peirce's opinion) – and the search for the (new) explanation. Since no suitable 'type' can be found, a new one must be invented or discovered by means of a mental process. Sometimes one achieves a new discovery of this sort as a result of an intellectual process, and if this happens, it takes place 'like lightning', and the thought process 'is very little hampered by logical rules' (Peirce 1931-35, vol V: 117, CP 5,188).

An order, or a rule, in this procedure must therefore first be discovered or invented – and this has to happen with the aid of intellectual effort. Something unintelligible is discovered in the data, and on the basis of the mental design of a *new* rule the rule is discovered or invented and, at the same time, it also becomes clear what the case is. The logical form of this operation is that of *abduction*. Here one has decided (with whatever degree of awareness and for whatever reasons) no longer to adhere to the conventional view of things.

This way of creating a new 'type', that is the relationship of a typical new combination of features, is a creative outcome which engenders a new idea. This kind of association is not obligatory, and is indeed rather risky. *Abduction* 'proceeds', therefore, from a known quantity (= result) to *two* unknowns (= rule and case). Abduction is therefore a cerebral process, an intellectual act, a mental leap, that brings together things which one had never associated with one another.

3. Two Strategies for Producing Abductions

If one is to take seriously what has been outlined above, one would have to come to the conclusion (pessimistic though it might be for everyday scientific practice) that abductive discovery of new things is dependent either on pure chance, a benevolent God, a favourable evolution, or a particularly well-endowed brain. Science as a *systematic* endeavour would, according to this definition, seem doomed to failure. 'Anything goes.'

However, – even if one cannot *force* lightning to strike in an algorithmically rule-governed way – could there perhaps be ways of proceeding and precautions that would make it easier for the (intellectual) lightning to strike? Because even lightning is not entirely unexpected. To extend the metaphor, it happens only as a consequence of a particular meteorological situation. In a storm one can look for the oak tree or seek out the beeches or even go to the top of the church tower. None of these steps will make it likely that lightning will come and strike; but the likelihood is nonetheless very much greater than with someone who only loves the sunlight, who always takes refuge in a cellar during a storm and who – if he does happen to find himself in a storm – always tries to find out where the nearest lightning conductor is. In short, if discovery is truly related to accidents, then one can either give accidents a chance or deny the possibility.

Peirce himself cites two *macro-strategies* that are particularly well-suited to 'enticing' abductive processes or at least to creating a favourable climate for their appearance. One can be derived from the story where Peirce talks retrospectively about his talents as an amateur detective (Peirce 1929). In this Peirce tells how, during a voyage at sea, his overcoat and his valuable watch were stolen. He was very alarmed, because the watch was not his own property. He therefore decided to recover the watch, by any means and as quickly as possible. He had all the crew called together and asked them to form up in a line. Then he walked along the line and addressed a few apparently inconsequential words to each of them.

"When I had gone through the row, I turned and walked from them, though not away, and said to myself: 'Not the least scintilla of light have I got to go upon'. But thereupon my other self (for our own communings are always in dialogues,) said to me, 'but you simply *must* put your finger on the man. No matter if you have no reason, you must say whom you think to be the thief'. I made a little loop in my walk, which had not taken a minute, and I turned toward them, all shadow of doubt had vanished" (Peirce 1929: 271).

Peirce named one person as the culprit and subsequently, after a great deal of confusion (see Sebeok & Umiker-Sebeok 1985 for a full description) it emerged that the man suspected by Peirce was indeed the thief.

The stimulus for this individual initiative in matters of 'detective' was therefore provided by *fear* - and not the fear of losing 350 dollars, which was the value of the watch, but the fear of an expected "life-long professional disgrace" (Peirce 1929: 270). The body went into a state of alarm, but clearly this was not enough. When, after the first conversations with the crew, he could not name a suspect, he increased, but an act of will, his pressure to do something. In this partially self-induced emergency situation the abductive lightning struck.

Of course, abductions cannot be forced by a specific procedural programme, but one can induce situations (and this is the moral of this episode) in which abductions fit. According

to Peirce the presence of *genuine doubt* or *uncertainty* or *fear* or *great pressure to act* is a favourable 'weather situation' for abductive lightning to strike.

Peirce, however, develops another possible way of creating situations in which new knowledge may more frequently be obtained. For this to work the investigator – as Peirce advises – should let his mind wander with no specific goal. This mental game without rules he calls 'musement', a game of meditation, or day-dreaming. How one achieves the condition of day-dreaming may be seen in the following formulation of Peirce:

"Enter your skiff of musement, push off into the lake of thought, and leave the breath of heaven to swell your sail. With your eyes open, awake to what is about or within you, and open conversation with yourself: for such is all meditation! (...) It is, however, not a conversation in words alone, but is illustrated, like a lecture, with diagrams and with experiments" (Peirce 1931-35, CP, vol. 6: 315).

To do this requires leisure, that is to say, freedom from an immediate pressure to act is a fundamental condition, without which the skiff will not be able to embark. This apparently contradicts quite vehemently the preconditions for successful abductions which Peirce sets out in his detection example.

Admittedly, the contradiction is resolved if one looks for what is typical in the two 'abduction-friendly' settings. For in both cases the procedures mean that the *consciously working mind*, relying on logical rules, is out-manoeuvred. Peirce-the-detective allows no time for the calculating mind to busy itself with the solution of his problem, and Peirce-the-daydreamer switches off his power of logical judgment by entrusting himself to the 'breath of heaven'.

All measures designed to create favourable conditions for abductions, therefore, always aim at one thing: the achievement of an *attitude* of preparedness to abandon old convictions and to seek new ones. Abductive inferencing is not, therefore, a *mode of reasoning* that delivers new knowledge, and neither is it an *exact* method that assists in the generation of *logically ordered* (and therefore operationalizable) hypotheses or some new

theory. Abductive inferencing is, rather, an attitude towards data and towards one's own knowledge: data are to be taken seriously, and the validity of previously developed knowledge is to be queried.

4. Research Results – Reconstruction or Construction?

Abductive efforts seek some (new) order, but they do not aim at the construction of *any* order, but at the discovery of an order which *fits* the surprising facts*;* or, more precisely, which solves the practical problems that arise from these.

The refuge for this selective attention (which targets a new order) is not the greatest possible closeness to reality or the highest possible rationality. The refuge is, above all, the *usefulness* which the 'type' that is developed brings to the question of interest. On the one hand it brings order and the means of linguistic representation, and on the other hand these new 'types' are indispensable tools if it is necessary to be able to make predictions about the future on the basis of a past that is hypothetically understood because it is ordered. In other words, they are indispensable when it is a matter of producing answers to the question of "what to do next?". New orders, therefore, are also always oriented towards future action.

An abductive discovered order, therefore, is not a (pure) reflection of reality, not does it reduce reality to its most important components. Instead, the orders obtained are *mental constructs* with which one can live comfortably or less comfortably. For many purposes particular constructs are of use, and for other purposes different constructs are helpful. For this reason the search for order is never definitively complete and is always undertaken provisionally. So long as the new order is helpful in the completion of a task it is allowed to remain in force; if its value is limited, distinctions must be made; if it shows itself to be useless, it is abandoned. In this sense abductively discovered orders are neither (preferred) constructions nor (valid) reconstructions, but *usable* (re-)constructions.

Abduction (as we have already said a number of times), when faced with surprising facts, looks for meaning-creating rules, for a possibly valid or fitting explanation that removes what is surprising about the facts. The end-point of this search is a (linguistic) hypothesis. Once this is found a multi-stage process of checking begins.

If the first step in the process of scientific discovery consists of the finding of a hypothesis by means of abduction, then the second step consists of the *derivation of predictions* from the hypothesis, that is, of a deduction, and the third step consists of the *search for facts* that will 'verify' the assumptions, which is an induction. If the facts cannot be found the process begins again, and this is repeated as often as necessary until 'fitting' facts are reached. With this definition Peirce designed a three-stage discovery procedure consisting of abduction, deduction and induction.

Finding and checking are, in Peirce's opinion *two* distinct parts of a *single* process of discovery, or research. If the finding stage is largely a result of a conscious and systematic approach, checking takes place according to operationalizable and rule-governed standards that are controlled by reason.

Certainty about the validity of abductive inferences, however, cannot be achieved even if one subjects an abductively developed hypothesis to extensive testing, that is to say, deduces it from its consequences, then seeks to determine these inductively, and then repeats these three steps many times. Verification in the strict sense of the word cannot be done in this way. All that one can achieve, using this procedure, is an intersubjectively constructed and shared 'truth'. In Peirce's opinion even this is only reached if *all* members of a society have come to the same *conviction.* Since, in Peirce's work, 'all' includes even those who were born after us, the process of checking can in principle never be completed. For Peirce absolute certainly, therefore, can never be achieved, and so "infallibility in scientific matters seems to me irresistibly comic" (Peirce 1931-35, Vol. I: X 1.9).

Further reading

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