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The summary by the editor (some of this may have been changed in the final print)

“Also the paper of Gerard de Zeeuw tries to bridge the gap between RC [Radical Constructivism] and SR [Scientific Realism], especially where the former lacks in concrete designs. He outlines a way to resolve the dilemma that the justification of RC is obvious from its own perspective but not from the position of SR and vice versa. It consists of an interpretation of RC as an advance into the 'next area of development' of SR, to achieve 'knowledge and knowing' precisely where, on its own terms, SR is not or no longer successful. De Zeeuw identifies two methods to combine and order publicly reported observations. Attachment sorts observations in terms of time, direction, source, viewing position, etc. The opposite, detachment, sorts observations into classes closed under the act of observation itself—or, in other words, under (secondary) observation. Closure implies results to be resistant to societal influence; it characterises the successes of modern science (see also the example of Plinius the Elder above). De Zeeuw notes that detachment does not require an (assumed) reality—contrary to common expectation but in line with Von Glasersfeld's skeptic's argument. On this basis he is able to argue that certain extensions of SR converge to RC—in particular combinations of attached observations that, as collectives, prove detachable themselves. This convergence allows for the development of concrete research designs for RC, as exemplified in the paper, and suggests a possibly (more) fruitful communication between RC and SR.”

Constructivism: a 'next' area of scientific development?

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Abstract

Radical Constructivism has been defined as an 'unconventional approach to the problem of knowledge and knowing'. Its unconventionality is summarised by its claim that it is impossible to attribute unique meaning to experience—as no mind-independent yardstick can be assumed to exist against which to identify uniqueness, and hence to produce knowledge and knowing. In other words, it is claimed that there is no 'reality' that is knowable to all individual knowers. This claim appears indefensible by itself, as it does not explain why the successes of traditional science appear as such. However, it is defensible in the context of numerous failures to achieve unique attributions, or of the history of science. Even so, what is missing are concrete methods and research designs. This often leaves Radical Constructivism to be critical only, to concentrate on justifying the impossibility of success without contributing itself.

Where this is the case it reduces scientists to individuals considered unable to communicate with others on public (and unique) attributions—who may do so only by borrowing methods from previous approaches. It is argued that a more valuable contribution is possible if Radical Constructivism is seen as a response to the challenge defined by frequent failures of traditional approaches. The latter may be extended such that the extensions converge to Radical Constructivism. Such extensions are based on reported observations, rather than on experiences in general, and are to be attributed meanings—uniquely as well as non-uniquely—by way of a collective. The latter should allow its 'actors' to restrict what maintains the collective to what is observable to others, as well as use the collective to restrict their own observations. The study of collectives thus allows for the study of restrictions or values, and hence for including subjective or constructivist experiences beyond (reportable) observations.

Key words: knowledge, knowing, high quality observation, 'attached' and 'detached' observation, complete collective, high quality experience, language, research design

1 Introduction

Radical Constructivism is “an unconventional approach to the problem of knowledge and knowing. It starts from the assumption that knowledge, no matter how it is defined, is in the heads of persons, and that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience. What we make of experience constitutes the only world we consciously live in. It can be sorted into many kinds, such as things, self, others, and so on. But all kinds of experience are essentially subjective, and though I may find reasons to believe that my experience may not be unlike yours, I have no way of knowing that it is the same.” (Von Glasersfeld, 1995; p. 1).

This definition shows a number of engaging features. It is interesting, as it appears to require further explanation, even though constructivists have

already used it as a banner. It is inconsistent, as it suggests that Radical Constructivists are able to agree on a solution to the 'problem of knowledge and knowing', while at the same time claiming that 'my' solution must be 'unlike yours'. And it poses a challenge. The definition can be read as saying that Radical Constructivism adds to the quality of life at moments when conventional approaches do not.

The first and third reasons suggest that Radical Constructivism is worth attention. The second reason confirms the maxim that no definition is able to stand on its own. It must be interpreted against some background. An example of such a background would be to interpret Radical Constructivism as a 'theory' of how people live. Against this background the definition would not be inconsistent—as theories in general parlance are shared more than what is in the individual 'heads of ... thinking subjects' anyway.

Another such background is scientific inquiry. It is positively linked to Radical Constructivism, as both are interested in notions such as 'subjective', 'knowledge', and 'knowing', but negatively as well. Although the definition does not explicitly refer to inquiry, it appears to reject precisely those characteristics that make it conventional—its methods of comparing experiences and presumably also the successes it may have had. Both types of links define the challenge and the context this paper responds to. What contributions may be expected in the future from either approach? Will they differ increasingly or converge?

Questions of this kind (and their answers) are not new and even appear frequently in mainstream history of science—for example in the form of the problem of induction (Popper, 1972). In the *psychological* version, induction depends on *each* individual's trust in previous personal experience. Any argument for such trust is historical and *open* (Quine, 1953). The *non-psychological* or scientific version refers to a *closed* argument; for example that everyone's reasons for *not* expecting the sun to rise tomorrow have been exhausted. *Closure* of this kind implies special characteristics, such as that it may be reported or transferred to others 'as is', without loss or gain.

Identifying when an argument is 'closed' constitutes a long-standing problem. Many solutions have been attempted. In some of them 'closure' is taken to occur by way of what is 'outside' the human mind, for example by way of a reality in which the sun must appear as the earth circles it. Others assume 'closure' to derive from the way people communicate¹. Communication itself has even been taken as central. Nominalism in particular proposes to 'close' the argument (and what may or may not constitute a sunrise) by only using concepts from (natural) language.

Radical Constructivism's contribution is to reject all claims concerning an 'outside'. This does not necessarily mean that there is no such thing, or that none can be experienced. What it focuses on is that this 'outside' never is sufficiently independent to 'close' the argument. It also does not suggest abandoning closure itself—as evidenced by the work of Von Foerster (1970, 1982, 1992) and Glasersfeld (1991, 1992). The first interprets closure as the result of experience operating on experience (or rather observation on observation), and the second as the appearance of a *fit* among co-evolving experiences.

Both forms of closure embody a *doubling* of experience on itself—of ordering some of its parts by other parts, rather than by anything that is 'outside' of what is ordered. For example, in the definition of Radical Constructivism the part to be ordered refers to what are called 'subjective' experiences, the ordering part to the sorting of experiences into 'things, self' and others'. Although experiences reported by others apparently are deemed admissible into either part, none is to be taken as dominant or definitive.

¹ The definition of Radical Constructivists does refer to 'others', presumably not only as personal constructions, but also as those we can share reports with.

Central to the present paper is the claim that conventional science developed by searching for a similar doubling, and by discovering special advantages in restricting doubling to (reported) observations. It is this restriction that makes it differ from Radical Constructivism. It has led to many successes of its own, but also to the definition of an area of failure and hence to a need to identify ways to 'close' the doubling of experiences other than observation. The paper explores how this need (and its fulfilment) relate to the solution to the 'problem of knowledge and knowing' that Radical Constructivism proposes.

The paper is structured as follows. In section 2 the problem is explored that conventional inquiry tried to solve. It led to attributing a special status to the (reported) experience of observation. It also defined the nature of any successes that are considered scientific. In section 3 conventional inquiry is extended so it may help 'close' doubling experiences other than observation. Section 4 presents ways to design the necessary searches. Section 5 concludes the paper. It is argued that such extended inquiry adds to the quality of life in the way Radical Constructivism aims for, and thereby responds to its challenge.

2 Observation and knowledge

2.1 A new procedure

More than at any other time we nowadays are aware of attempts to solve the 'problem of knowledge of knowing'. We know of large numbers of learned treatises and texts—in some cases even of what was in the famous library of Alexandria before it was set to fire (3rd century AD; Canfora, 1986). Much was lost in this fire, which has to be deplored the more as for most of history what was lost could not be regenerated. Knowledge and knowing depended on the very words used. This changed in the 17th century, when it became possible to regenerate at least part of anything that might be lost.

It is not entirely clear yet what enabled this change or why the procedure on which it depended proved so effective. What is clear of course is that it was based on a number of earlier initiatives—for example those of Nominalism and those intended to resist the Aristotelian worldview². Eventually people's efforts focussed on a doubling of one type of experience only, namely (reported) observation—or in other words, on observation to order observation (Descartes, 1977). It was this doubling that evolved into what today we understand as (fundamental) science.

This is not to say that observation was absent before the 17th century. People could report their observations, and did report for example what they saw during the voyages of exploration of the 15th and 16th centuries. What was lacking was a valid and fair procedure to justify what later would be reported (Twain, 1963). Referring to others proved ineffective, as they often tended to compete by reporting even 'stranger' stories. Increasingly, standard ways took too much time. They required that stories were 'judged' by church committees (who had to go by the book, that is the bible).

The procedure that replaced such judgements consisted of reporting not only observations, but also observations of what made those observations belong together³. People had to report the *class* of which their observations were an instance. This implied that they had to report how to 'close' their observations, and achieve *observational closure*. If successful, this allowed others to recognise 'old' as well as 'new' specimens, and more generally, to determine

² Attempts to understand the 'world' add something to our experience: an idea, a concept, a judgement, a 'deep' structure in what we observe, etc. What started science going is the 'doubling', an ordering in terms of similar experiences.

³ Variations among the members of a class are described in terms of 'variables'.

which of their observations were the same as those of others in the sense of being members of the same class⁴.

This 'closing' procedure has two features in its favour. Firstly, it may accept anybody's reported observations as input, whatever that person's *time* or *place*, and however 'prejudged'⁵ (Hanson, 1958; Gadamer, 1975). This kind of input does not imply a 'closed' output, but if it happens, secondly, the class involved must be independent of individual variations and (pre-) judgements. It will be observable to anybody, therefore, without loss or gain due to time and place. This is what has been defined as a success. It implies a *detachment* of (reports of) observations from their originators as well as their addressees.

This procedure of 'detaching' observations has characterised scientific inquiry since its start (and has been emphasised by it). It has many advantages, such as the possibility of regenerating lost observations, as long as their class is recognised. The major advantage, however, seems to be the identification of what may be defined as *high quality* observations, or rather the possibility to *improve* individual observations. This is effected by allowing the label of a class (usually some form of averaging⁶) to replace its elements—which of course does not lead to gain or loss only if the class is 'closed'.

It has been frequently remarked that 'detachment' is exceptional: it refers to cases and conditions that are easily drowned in the sea of observations that haven't been 'detached' yet or appear impossible to 'detach'. This rarity may explain the wonder many scientists express when detachment does prove possible—for example Eugene Wigner (1960), who emphasised the *miracle* of any successful application of the language of mathematics in the study of physics.

That 'detachment' remains an exception does not mean that what can not be 'detached' can not be improved in other ways. For example, sorting 'subjective' experiences into 'things, self, others' also can be seen as an improvement, and as requiring a formation of classes as well—of observations and experiences generally'. The elements in such class become 'attached'. 'Attachment' sorts by adding—a time, a place, a direction, a person. It implies an 'authoritative' definition, therefore, including 'magical' constructions (a classification 'post hoc, propter hoc'; Frazer, 1993).

New procedures are notoriously difficult to develop, and only slightly less difficult to explain. They have to be clarified by models⁸. The one best known for conventional inquiry is Bentham's *panopticon* (Foucault, 1974)⁹. It allows 'guards' to compare their (reports of) observations to 'detach' them, with as little interference from 'prisoners' as possible. Although not designed for that purpose, the model also helps to clarify 'attachment'. The way 'prisoners' are boxed in—prevented from seeing each other—classifies their experiences (if reported) in place, in time and by person.

⁴ To test a statement like 'all swans are white' one has to recognise swans as a 'closed' class first—preferably not by enumeration, but by recognising the class as well as its elements. Next one may check on variations in colour among the swans. Sometimes the two tests go together (Popper, 1972).

⁵ 'Pre-judged' in the sense of having been selected from all reportable experiences by particular individuals. Checks on closure are made after such a selection.

⁶ 'Averaging' numbers is the first form of improving observations that people became aware of (in astronomy; Dijksterhuis, 1950). 'Averaging' interpreted more widely: it refers to any label one may attribute to a 'closed' class, including the label of 'law'.

⁷ Neither form of improvement requires a mind-independent reality that 'is' observed. Notice that it is not claimed in this paper that there is no such reality, only that it does not have to be assumed to improve on observations. Negating such a reality, as some constructivists tend to do, is as unfounded as assuming it.

⁸ The notion of doubling re-appears in different methods and techniques, in different forms, for example as 'convergent validity', etc.

⁹ An actual panopticon (with wooden separators) may still be visited in the old prison in Lincoln, UK.

2.2 Closure and action

Why did the restriction of experience to observation help to establish conventional inquiry? The reason often is taken to reside in the notion of observation itself—in particular when seen as (reported) sense experiences, which may be compared to an ‘outside’. There are other interpretations, however. It may be seen as an action, similar to running, or solving a problem, or as the use of a searchlight, to delineate observations (Popper, 1972; Beveridge, 1951). What must be emphasised is that these interpretations link to a different notion of observation than that in scientific inquiry.

The latter is interested in how observations (or experiences generally) are to be *operated upon* to solve the ‘problem of knowledge and knowing’ (section 2.1). What is to be expected, therefore, is that what operations are possible depends on what is chosen as input and that what is accepted as input depends on what operations are chosen. Neither choice fully depends on how observation is interpreted. There may be many interpretations that are compatible with the input chosen. This may be argued, firstly, in terms of what experiences do not allow for closure.

Suppose one would go back to the time just *before* science, the Middle Ages. Most of what was experienced or observed at the time was restricted by ‘authoritative’ texts, in particular the bible. The obvious way of doubling and closing would be to use the *textual metaphor*, therefore (in the same way the *optical metaphor* was used to double observation), to explore texts on classes of texts, etc. No closure or ‘detachment’ proved possible at the time, and no replacement of what was firmly ‘attached’ to the church.

The same conclusion follows in case of other experiences. It may be attempted, for example, to *hear* what *hearings* belong together in one class, using the *auditory metaphor*. Again it is difficult to imagine what to expect in case of (auditory) closure. The result might be a hearing with a beginning and an end, that is a melody. Musical pieces remain ‘attached’, however, although they may approximate ‘detachment’ in the sense that they are ‘attached’ to large groups of people. Comparable results follow from attempts to create closure using the *haptic* or *olfactory metaphor*.

The above suggests that the doubling of experience allows for ‘closure’ only ‘optically’, that is in the case of observations (and even then only as an exception). Attempts to double other experiences (‘auditorially’ in the case of hearings, ‘haptically’ in the case of touch, etc.) only seem to lead to ‘attachment’, as in the case of a melody. The same appears to hold for experiences such as (reported) feelings, values, norms, ethics, intentions, etc.—although this is only suggested here, not argued (see section 4).

One objection to the above argument would be, of course, that comparison of (reports on) for example smells does take place, as in the perfume industry. No ‘closure’ seems to be attempted or even accidentally achieved, however. Results refer to comparisons that become ‘attached’ to expert ‘sniffers’, and eventually to clients. Conversely, when closure concerning smell does appear to be achieved, it refers to observations—for example of the chemical composition related to reports of odours.

That closure and what is chosen as scientific input are strongly linked, may be argued, secondly, in terms of the similarities between what happens when one tries to ‘detach’ what is ‘attached’ (see section 2.1). If observation is seen as action, then ‘detachment’ implies a *neutralisation*—the removal of direction, and the severance of any ‘attachment’ to (other) actions. If observation is seen as a searchlight, then it implies a *convergence* to a viewpoint for which no time and place are specified. If observation refers to an ‘outside’, it implies a *stabilisation* of what is reported over time.

What appears especially useful in the context of the present paper is the notion of the ‘neutralisation’ of observation. Wherever it was realised, it helped

to resist the 'authority' of the observations and experiences that were 'attached' to organisations such as the church, nobles and kings. The new tool also brought advantages to the individual. It helped to make observations useful to actions, without the risk of inter-action, and hence to increase the variety in people's actions (Rosen, 1993).

Two conclusions may be drawn from this analysis. The first is that the emphasis on closure and on input were fundamental to scientific inquiry as the new and most successful social activity of the 17th century. The second is that both also define where inquiry may fail¹⁰, and where one has to consider a 'next area of development' (Vygotsky, 1977). Any such development must be characterised by an interest in improving experiences other than observation, and by a reconsideration of what 'attachments' to replace—or what directions and links to remove.

3 'Next development'

3.1 Complete collectives

The following should happen to develop this 'next area'. Attempts to 'detach' some 'attached' observations should fail—to a worrying extent. The reason should be that an action is involved, with a direction and time period. Not being able to 'detach' observations means that it is impossible to 'neutralise' this action, and make it time-less and place-less. It may be possible to do so on a more collective level, however. One may make it part of a set of inter-acting actions. Creating a set that is neutralised, and allows for 'detachment' of at least some observations, would extend the notion of closure, as well as implement this extension¹¹.

If a set only allows for 'attaching' observations, it is called a *collective*. If some observations can be 'detached', the collective will be called *complete*¹². (Completing a collective thus is analogous to observationally closing a class). Completeness distinguishes between observations on the level of individual actions (which can not but remain 'attached'), and observations on the level of the collective (which are 'detachable').

Collectives depend for their continuation on the observational variety introduced by its participants. Sources of actions in a collective are referred to as *weak actors*, while those in complete collectives are called *strong actors* (at least two in a complete collective). 'Strong actors' acquire some special characteristics (see section 3.2). Achieving these characteristics defines the importance of the 'next area of development' of conventional inquiry, on its own and in relation to approaches such as Radical Constructivism.

Complete collectives may develop in a historical process¹³. Examples include team sports—which originally were indeed meant to constrain 'attached' actions that became too detrimental—and needed to be constrained (murderous fights between students from Cambridge and Oxford; Mangan, 1986). Football players *absorb* observations on their actions such that they may finish a match notwithstanding yells from the public, hooliganism, advice by the coach of the 'other' club. 'Detached' observations are transmitted in terms of variables such as scores, numbers of red cards, etc.

¹⁰ Failure obviously is not easy to recognise. Scientists have to decide whether to accept that 'detachment' was *not yet* achieved, or will *never* be achieved. The decision 'never' requires a leap of faith.

¹¹ New forms of mathematics often develop similarly, by maintaining the form of a calculus, but changing its content.

¹² It is not claimed that there 'are' complete collectives; they are the result of a process of 'detaching' as well as of changing interactions.

¹³ This process is often studied itself as constituting an instance of a conversation (Pen, 1989; Pask, 1976; 1992).

Completeness may result also from a systematic series of actions—for example requesting (reports of) observations, comparing them, determining 'attachments' and allowing 'attachments' to be constrained by other 'attachments', etc. Plans for such series constitute *research designs*. Results will include ways to initiate a collective and to allow it to become complete. They may be transmitted and implemented later and elsewhere—if sufficiently time-less and space-less.

The notion of research designs suggests another example. Suppose someone tries to 'detach' some observations, but only succeeds in 'attaching' observations to that search—for example by generating its own classes of (reports of) observations. Such a search may be combined with other, usually similar actions—for example through interactions such as discussions and demonstrations. If the resulting collective achieves completeness it is called a *scientific forum* (De Groot, 1971, 1985). Results are on the level of the forum only, not on the level of its members¹⁴.

Although historical or 'non-systematic' developments do lead to complete collectives, there is a difference with 'systematic' searches. A useful metaphor is that of a medieval walled city. It appears to be complete (and to allow for 'detached' observations), but consists of two sub-collectives. One of them, the wall, functions as a 'buffer' (Thompson, 1967). 'Historically' the cost of this buffer might appear acceptable. 'Systematically' one would be interested in interactions that minimise this cost, something that might be labelled metaphorically as creating a 'non-walled' city.

3.2 Strong actors

Although people participate in collectives on the basis of their observations, they will have other experiences as well. They may feel stimulated or frustrated, they may experience smell, touch, and sounds, they may be motivated to maintain a collective, etc. In other words, if a collective develops, people will experience changes in observations, but also in experiences more generally. These changes will be 'subjective' in the sense that they do not have to be the same for each participant. Special changes may be expected when the collective also is complete.

Being able to change experience is important as it suggests a positive reason why one might wish to develop the 'next area' of conventional inquiry, instead of avoidance of failure. It is to 'know' what collective to initiate if changes in experiences other than observations are desired. The development of the 'next area' implies an important extension of inquiry, therefore. It appears to suggest 'scientific' ways (based on 'detachment') to construct one's 'world' on the basis of the 'subjective' experiences that Radical Constructivism is interested in.

An example of a change related to a complete collective is the experience of *time*. In terms of its 'detachable' observations, such a collective will be time-less (or nearly so), in the sense of allowing for (reported) observations from the same class whenever it is realised. This is not the case for the actions on which the collective depends. Each may relate to a 'subjective time, or time scale—except for the time at the beginning and the end of the collective. Complete collectives function as time-containers, which supply and maintain differences in time whenever they are applied.

More importantly, 'knowing' time does not imply that this concept has a unique meaning, as is usual for conventional inquiry. Given a complete collective, many meanings may be accepted as 'knowledge'. The same holds for

¹⁴ De Groot is especially interested in members who might have a high score (ELO rating, as in chess) in trying to 'detach' but not succeeding.

other notions, such as honesty, fairness and justice¹⁵. The argument is as follows. If some actors would succeed in dominating or tyrannising a collective, that collective would become 'attached' to them. It would no longer be complete. Participating in a complete collective will provide incentives to act without *ulterior motives*, therefore, and hence to act honestly, fairly and justly.

'Knowing' how to implement such values constitutes a relatively *general* result of the search for complete collectives. The reason is that complete collectives imply that strong actors are honest, fair and just, as argued. But not only that. They are *free* to switch to other complete collectives, or to initiate new ones. In this way, 'knowing' how to implement such collectives implies 'knowing' how to succeed in being honest, fair and just. It is in this freedom that complete collectives referring to people differ from collectives referring to atoms or molecules (Lewin, 1992)¹⁶.

4 Designing research

4.1 Model questions, answers and usage

What appears to be needed still is an indication of how to develop research designs, that is of the practice of searching for complete collectives. This may be presented in terms of three 'model' aspects. The first is the *model question*, or 'what constraints on actions lead to complete collectives with what 'detached' (and possibly desired) characteristics?' The second refers to the *model answer*, which defines the form in which results of searchers should become 'known'. The third identifies *model usage*, or how actions may be supported by model answers.

The model answer is derived most easily from the formulation of results in conventional inquiry. This formulation relies on the notion of variables, which summarise what still varies over a 'detached' class. Results take the form of statements concerning relations between variables, therefore, possibly modified by parameters and conditions. The set of such statements may be described by an alphabet and by a grammar. It thus may be referred to as a language, the *language of variables*¹⁷.

Results of searches for complete collectives may be formulated partly in this language, to transmit or report its 'detached' observations. This is not sufficient, however. What also must be reported are the constraints on actions needed to construct the collectives. Together these constitute a language as well—providing an alphabet and a grammar to inform (strong) actors. 'Knowing' how to construct a complete collective thus implies 'knowing' two languages: a language that supports construction, and a language to transmit the resulting 'detached' observations (Löfgren, 1991).

The two languages do not coincide (as otherwise inquiry in the 'next area' would not differ from 'previous' inquiry: both would use the language of variables). It often appears difficult to distinguish the two, however. This holds for many of the languages that have been developed already, and allow for an interpretation as 'next' results. An example is the *language of problems*, mainly developed by Newell and Simon (1972). It helps to initiate and maintain a collective of 'problem owners', by constraining the way they interact. It also serves as a variant on the language of variables, when it helps to describe and

¹⁵ The principle involved is well-known already: search for what is non-normative itself (complete collectives), but normative in its consequences (the change in the experiences of members). It is used also in the notion of an 'original' state (Rawls, 1973).

¹⁶ Any village seems to need a 'village idiot': if one leaves, there usually is someone next in line. New searches are necessary to 're-install' freedom in this case.

¹⁷ This language is constructed, or artificial. It is especially effective when used for transmitting 'detached' observations.

transmit 'solved problems'—the result of what 'problem owners' are able to achieve, but weren't before completing their collective.

The *language of decisions* provides another example. It often is assumed to transmit classes of observations, labelled organisations, and hence to serve conventional inquiry. Of late this use of the language has come under severe criticism. It has been noted that members of organisations do not make decisions, but often are part of the flow of making decisions—and consider aspects one after the other rather than together in one decision (Chia, 1996; Erlandson e.a., 1993).

It seems relevant, therefore, to re-interpret this language as a 'next' result. This implies that it may serve to transmit observations *given* the completion of a collective (in which case it functions as a variant of the language of variables), as well as to help its *initiation*. It constrains members of collectives to act as decision-makers, therefore, and indicates in what direction to achieve completeness (so members become strong decision-makers). 'Detached' observations on such collective usually are transmitted as reports on sets (or organisations) of decision-makers.

Many re-interpretations of this kind can be found in the literature. This indicates a change in the awareness of the need for 'next' model answers. The re-interpretations concentrate on notions such as *mutual feedback* (Weick, 1995), *fabulae* and *scripts*, that is stories that develop meaning from being told in an organisation (Vahl, 1994a, b; Clark and Salaman, 1996; Humphreys, 1984). Model answers of this kind seem to be increasing, presumably in reaction to the impossibility of 'detaching' observations that have become strongly 'attached' to some action (section 2.2).

Model usage in the case of conventional science is based on a full 'detachment', that is on a full separation from what is not 'neutralised'. It takes the form of the *control model* (Ashby, 1964). In the case of complete collectives, two forms of model usage may be distinguished. One is the control model—still to be used given 'detached' observations. The other usually is labelled *self-organisation*, and refers to actions to complete a collective, and to resist what prevents completion (Von Foerster, 1982, 1992; Maturana, 1988; Watzlawick, 1992).

4.2 Examples

A study by Fischhoff (1992) is introduced first to exemplify the search for complete collectives. He wanted to help women to 'know' how to prevent or evade social violence, in particular rape. He tried to 'detach' the necessary observations. As no 'closed' class had been found in previous research, he tried to add constraints of his own, in particular those of being a decision-maker. Observations had to help potential victims *decide* on a preventive or evasive action. The constraints were only meant to construct a class, however, not a collective.

Observations were collected from widely ranging groups of people: (female) students; alumnae; mothers belonging to a parenting program; male students; and sexual assault experts. Interviews and questionnaires led to more than 1,100 'options for reducing the chance of being raped'. The options resulted from 'sorting' the observations to exemplify 'doing action X in order to achieve intended effect Y'. Unfortunately, it proved impossible to find any statement that could be considered justified in that only Y would follow from X.

This outcome is striking as (conventional) research procedures were carefully designed and followed. The number of (reported) observations was sufficient to apply the methods of analysis that are usual in decision analysis. Further observations also did not seem to help the analysis to proceed. If anything, the study appears to have been more careful and more inclusive than is standard. Fischhoff stopped searching for 'detached' observations.

Instead he decided on an analysis where potential victims no longer are assumed to choose some action X independent of any knowledge about the individual attacker. A new level of observation was added. (Potential) victims were to choose constraints on actions X such that a (desired) Y would become possible. For example, rather than implement 'do not faint', they had to explore whether or not to respond to an attack by fainting. This was summarised in advice such as 'keep thinking', 'try simple decision rules' and 'don't trust expert advice.'

The new analysis clearly reflects an attempt to initiate a collective, rather than a class. The collective would include the victim and the violator—who now would *both* be assigned actorship (Baars, 1999). Completeness would be achieved if it would be possible to develop a suitable language, to help the violator and the victim to mutually create a collective in which violence would have no place—while other 'subjective' experiences, for example values, would. Statements in that language would have the form 'I will do action X, if I observe that others choose action A.' This language seems more like a *language of games*, than of decisions.

Vahl (1994a) conducted a similar analysis when she was asked to evaluate five experimental service teams. Conventional evaluation research would look for 'detached' observations, by way of a class constrained by the teams' objectives. Unfortunately, searches of this kind tend to 'attach' observations to the commissioner of the evaluation. This raised the question how to constrain the actions of the team members so they would be able to self-organise complete collectives. Such constraints would allow them to minimise costs (or maximise output), and be beyond (subsidy-related) criticism.

The author chose to start from a language based on the work of Axelrod (1984) and Howard (1971), with sentences of the form 'If observation A (of the action of a previous actor), (let the next actor) do action X'. Members of the team next interpreted these sentences in terms of their own semantics. Finally she taught members to daily update the meaning of their Xs and As—for example to change X when A would change (if new clients would be introduced or new political demands). This made the teams complete (coherent, resilient, sufficient). Feelings of enthusiasm returned, costs were reduced and the quality of the service to clients increased.

A study by Nieborg (2000) attempts to do the same, although in a broader context. There has been a spectacular rise in the participation of women in the Dutch labour market over the past two decades—however, without a significant compensating change in the division of labour in Dutch households. Women still are supposed to provide most of the childcare. This does not appear to be due to a lack of awareness, or effort. The Dutch government helps by creating crèches and other forms of support—at the rate of more than a quarter of a billion US dollars a year.

The author concluded that contributions had to come from the 'area of next development'. She interviewed members of 'stressed' as well as non-stressed families, marriage counsellors, government officials and employers. This material was analysed as to 'languages' which families could use to function as *strong actors* among other strong actors. The resistance to a change of the division of labour inside families appeared due to the domination of actors (not all strong) in contexts such as house owning, work, child care and crèche support.

Evidence was collected that the use of the 'languages' did make it possible to change the division of labour in the families. Members started to 'think about' their roles, and in particular, to think about and learn to manage the demands made on their time through stereotypes such as 'managers have to socialise after hours at cocktail parties'. Feelings of stress and of being inadequate decreased.

The studies are meant to demonstrate that conventional approaches may fail in ways that are more fundamental than a simple 'not yet' (see section 2.1), and

also that it is possible to 'go beyond' the conventional while keeping what is characteristic to inquiry¹⁸. It should be emphasised, moreover, that this is indeed a 'going beyond'. Although the examples do show some links with present day interests in chaotic and dissipative phenomena, their aim is clearly different: to search for languages. They do not exemplify studies in collective behaviour (Briggs and Peat, 1985; Penrose, 1995; Barrow and Tipler, 1986; Waldrop, 1992; Lewin, 1992; Casti, 1994).

5 Conclusion

Radical Constructivism has been defined as an 'unconventional approach to the problem of knowledge and knowing' (section 1), its major tenet apparently being that there is no mind-independent yardstick against which to measure the quality of any solution—not even in conventional inquiry. Such a claim immediately raises questions as to its own justification—or what yardstick it needs to measure up against what it rejects. Answers to such questions are obvious from the point of view of Radical Constructivism itself, but presumably differ from those of what it rejects.

The two points of view involved present a dilemma that is difficult to resolve. The normal procedure would be to consider the dilemma from either point of view, or position, to identify whether one or the other allows for a yardstick that would be acceptable to both. In the present case this procedure clearly fails. Fortunately, there is another procedure. It starts by noting that all positions have a history, and that their relation may depend on (some) time. Both may start by developing solutions to the same problem—and eventually converge or separate totally.

The latter procedure is at the basis of the argument in this paper. In its first and main part an attempt is made to identify the 'next area of development' of conventional inquiry, assuming that such inquiry is the solution to a *previous* 'problem of knowledge and knowing' (section 2). Solving this problem required concentrating on *observation*, and on *detaching* it from situated interests. Such 'detachment' serves to *improve* observation, and also to separate it from action so it can be used to resist societal power.

This (previous) solution proved effective in many areas. Eventually difficulties began to appear, especially when it was tried to 'detach' or 'improve' experiences other than observation. An area was identified where observation resists all efforts at separation. Attempts to 'detach' observations only appear to 'attach' them to what shows direction, and has time and place. This defines a 'next area of development'. It should be dealt with by holding onto what is effective in the previous solution, and by adding what removes the difficulties (section 3).

The notion of complete collectives provides a 'next' solution. It suggests to *combine* 'attached' observations into collectives such that observations on the collective can be 'detached'. The collectives are maintained by actions, each of which provides the necessary constraints to other actions. Searching for complete collectives may result in 'knowledge' on how to change experiences other than observations—values, aims, morals or smells—by 'detaching' observations on the level of the collectives (section 4). Given such 'knowledge' participants will be able to interact honestly, fairly and justly.

This (previous) solution and its extension may be compared, secondly, to what is claimed in the definition of Radical Constructivism (section 1). A first conclusion from the analysis (section 2) is that there is little reason in attributing an external yardstick to conventional inquiry. It clearly is impossible to 'detach' observations and to compare the results with some—presumed—objective

¹⁸ The literature shows many attempts to go beyond conventional inquiry: action research, system research, natural inquiry, and so on. Most approaches emphasise being 'unconventional'. Their literature seems to be described best, therefore, as 'apologetic'.

world in other ways than by using precisely those observations that are part of the 'detachment' (Kooistra, 1988).

A second conclusion is that there are many similarities between Radical Constructivism and the 'next development' to conventional inquiry. Both are interested in improving experiences more generally, beyond observation, for example to construct 'worlds' that are personally supportive, and to improve on values such as honesty, fairness and justness. In the context of scientific inquiry the two approaches even may be taken to converge (De Zeeuw, 1991).

Such a convergence would have a number of advantages. Firstly, from scientific inquiry one should keep the special role of observation in solving the 'problem of knowledge and knowing'. It suggests how to search for complete collectives, and design research to construct 'subjective' worlds. Secondly, Radical Constructivism reminds one of what appears easy to forget, which is that conventional science is but one solution to the 'problem of knowledge and knowing', and should not be taken as a model for its own 'area of next development'.

One conclusion in particular appears worth mentioning. Results from this 'next area' take the form of *languages*, of alphabets and grammars that constrain interactions. Languages in this sense extend the notion of the language that helps to transmit results from conventional inquiry (the language of variables)—in the same way that the notion of complete collectives extends the notion of 'closed' classes of observations. What Radical Constructivism appears to contribute is indeed one more such language. It emphasises the need for 'knowledge' to construct desired experiences.

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