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ABSTRACT: This paper focuses on the role played by the so-called fallacy of conditional transposition. It is really any of several fallacies of statistical reasoning often found in legal arguments. The paper illustrates the difficulties that context-dependence poses for overcoming the fallacy. To avoid fallacious reasoning about probabilities in criminal trials it is necessary to introduce an argument-operational approach; and a dialectic trial phase with conjectural argumentation is needed to reach a judgment beyond any reasonable doubt.

KEYWORDS: argument, argumentation, conjectural, fallacy of conditional transposition, operational, reasonable doubt

1. INTRODUCTION. THE FALLACY OF CONDITIONAL TRANSPOSITION

Often during the trial inquiry one can be tempted to make inferences which over evaluate the scientific evidence of the laboratory information. Before analyzing the two versions of what is commonly called the fallacy of conditional transposition, we need to briefly outline the methodological use of the terms; for methodological reasons only, I will use the term "fallacy" as a synonym of "error" and "argument weakness," warning that it would be better to analyse the various and different semantic expressions of such terms (Walton 1995, p. 16). Let's immediately explain the error of conditional transposition, by means of some formulas. S corresponds to: John shot Peter with the gun k; S1 corresponds to: John only threatened Peter with the gun k. S is S1 imply N: John's fingerprints are present on the gun k. So the probative value of N is zero. What happens instead when the argument is fallacious?

> N is observed; S and S1 are assumed; if S is true, N is than very probable; if S1 is true, N is than not probable; N is therefore very trustworthy.

This is a fallacy commonly occurring in criminal trials and elsewhere. A prosecutor has collected some evidence (for instance a DNA match) and has an expert testify that the probability of finding this evidence if the accused were innocent is tiny. The fallacy is committed if one then concludes that the probability of the accused being innocent must be comparably tiny. Why this is fallacious: several examples. A concrete example can

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make it clear why this reasoning is fallacious. Suppose there is a one-in-a-million chance of a match given that the accused is innocent. The prosecutor says that means there is only a one-in-a-million chance of innocence. But in a community of 10 million people, one expects about 10 matches by pure chance, and the accused is just one of those ten. That would indicate only a one-in-ten chance of guilt, if no other evidence is available. Consider for instance the case of Sally Clark, who was accused in 1998 of having killed her first child at 11 weeks of age, then conceived another child and killed it at 8 weeks of age. The defence claimed that these were two cases of sudden infant death syndrome; neither prosecution nor defence offered any other explanations for the deaths. The prosecution had expert witness Sir Roy Meadow testify that the probability of two children in the same family dying from sudden infant death syndrome is about 1 in 73 million. To provide proper context for this number, the probability of a mother killing one child, conceiving another and killing that one too, should have been estimated and compared to the 1 in 73 million figure, but it wasn't. Ms. Clark was convicted in 1999, resulting in a press release by the Royal Statistical Society which pointed out the mistake.

It comes immediately out the weakness of such characterization: it is not enough that the likelihood of S must be greater than the likelihood of S1 in order to deduce that S is more credible than S1, unless we also assume that the two hypotheses are at the beginning equiprobable, given the background knowledge. Garbolino underlines that the availability in terms of verisimilitude of the prevalence of an hypothesis face to another, does not offer any guarantee in terms of credibility, as such prevalence does not imply equiprobability, given the background knowledge. For instance (Garbolino 2000, p. 7), there is no violation of the thematic context in the experts aiming at ascertaining the fatherhood carried out using the so-called Essen-Moller test, as this one is not carried out disregarding an equiprobable assumption and often our background knowledge is able to justify said assumption on the basis of the starting hypothesis, "x is y's natural father" and "x is not y's natural father."

The first step toward the overcoming of the fallacy of conditional transposition consists in singling out and analyzing where the error is contained in order to analyse its physiology and try to cancel it. A fitting example is given by the judiciary experience, when scientific evidences are submitted to the judge, because the technical consultant or the expert often do not produce the analytical results in the most aseptic way and are carried away by evaluations leading directly to the hypothesis credibility, without considering likelihoods connection (Pizzi 2005). The Dreyfus Affair is a specific matter pointing out and determining that the mistake of conditional transposition occurred once more. Shortly, the Public Prosecutor's Office stated that a specific document, the bordereau, found by the French counter-espionage in a wastepaper of the German Embassy and written by Dreyfus himself, as he admitted, contained coded messages; in fact, in such document the letters apparently had a different frequency if compared with the "normal" French prose. The forensic scientist Bertillon, charged to provide a technical-scientific explanation of the criminal action, undertook the calculus of probability that the particular combination of letters found in the bordereau was accidental, starting therefore from the conjecture that Dreyfus was not guilty and did not write any coded message (Garbolino 2000, p. 7). This probability turned out very low according to Bertillon's calculus. For this reason, and because of the general conditioning arising from scientist's reputation, they came to the conclusion that also the probability of

Dreyfus's innocence, i.e. his credibility, was really low. In the appeal, by means of a memorial written by three wises, among them Henri Poincaré, justice was done for this fallacy (and for Bertillon's calculus) and the right principle of likehoods connection for the evaluation of the proof was stated (Garbolino 2000, p. 8).

2. THE FIRST STEP TOWARD FALLACY SOLUTION. THE DECISIONAL PROBLEM.

If you just for a while think about decision-making problems, you soon become aware of the existence of a peculiar and preliminary phenomenon, whose analysis lets us shed light on the various aspects of any trial action philosophy**:** this fundamental phenomenon is choice (Perelman 1979, p. 167). Any purely theoretical examination can have a dubitative result, since you are not obliged to come to a "yes" or "no" conclusion, as you can defer your decision, asking for more time to complete the examination of the problem you are facing with. Obviously, a different approach is required, when practical problems are concerned, such as trial decision-making problems. We must now choose. And, in order to choose, your decision must not be either necessary, or arbitrary; there must be an alternative choice to your decision and well-founded reasons to justify your choice (Perelman 1979, p. 70). This is the meaning of any deliberation, be it the decision of one single judge or the determination of a jury. A deliberation makes sense when some choices are considered better than other ones, not when any person called to decide, acting in a fully arbitrary way, can decide on a whim what is useful and what is good, what is fair and what is honest (Perelman 1979, p. 87). But the good trial choice is not sufficient. You must take into account what Perelman defines as "agreement" (Perelman 2001, p.105), that is a regulation in conformity to which decision-making action is developed, according to a process conditioned by reasonable doubt; the judge passes a conviction if the defendant has been found guilty beyond any reasonable doubt.

In order to let the judge make "good choice" on the grounds of the existing "regulative agreements," promoting the necessary favourable conditions is required. Therefore, an approach fully based on scientific evidence must be controlled and lessened by careful reflection on effective processing of the scientific results, so as to cut down their formal contents, following a procedure being deeply affected by the principle of reasonable doubt. In a word, the possibility of a radically scientific option inevitably implies a strong tension for the judge, facing not only the natural inaccessibility of scientific knowledge, but also some limits of the experts' credibility and reliability, as well as some limits to the validity of extra-trial scientific research, that still affect the experts' reports.

3. ARGUMENT-OPERATIONAL EXPERIMENT

To sum up, the risk for the judge is either to yield to science determinations, thus getting into fallacy of conditional transposition, or to choose to decide of his own free will (Laudan 2006, p. 6), based on his personal insight, unrespectfully of scientific laws, through a highly peculiar justification procedure (Stella 2003, p. 150); or simply accepting the opinion of the expert for prosecution (again the fallacy of conditional

transposition), considering it fair and probative to such an extent, as to immediately upset the trial balance.

How to avoid the danger of falling into the fallacy of the transposed conditional? Is decision beyond reasonable doubt possible, without eliminating fallacy? I do not think so. Maybe a solution could be found in Farley's interesting program (Saferstein 1993, pp. 173-174), suggesting a protocol to be followed for the experts' final examination: the expert qualification and authority must be assessed on the grounds of the researches he carried out, both in a specific and related fields and of his previous recourse to the technical and scientific instrument in trials; the judge must be informed anyway of the error rate -that, obviously, cannot be determined with utmost accuracy for new technologies- as it comes out from carried out researches, that cannot be ignored; the technology degree of novelty, as compared with other older and more extensively adopted technologies; the analogy between new, still unchecked technologies and the ones that have been already tested during trials; taking into account the possibility for the object being studied to be affected by factors different from those relevant to trial; the possibility for the data obtained from probatory technical operations to be confirmed by analyses carried out with different methods, or, anyway, by other probatory elements; the research accuracy degree; the degree of probatory effectiveness to be ascribed to the research. But in my opinion, Farley's analysis can be adopted only in the final phase, when scientific results are made clear to anyone. In a word, a good protocol is useless unless the object of discussion is made clear from a linguistic point of view. The easiest solution seems to be taking as a starting point the same prescriptive agreement, ordering experts, after conclusion of their research, to verbally present its results, answering questions and drafting the expertise, submitting himself to examination and counter-examination, after previous determination of the specific facts relevant to examination itself. Therefore, there are three different moments, three separate phases, that we will call topic-operational-conjectural experiments to go through, in order to come to effective argumentation, and, finally, to subsequent judgement beyond any reasonable doubt. The first topic-operational-conjectural experiment takes place in the phase when scientific results are made known, followed by questions and written report; the second experiment consists in searching specific facts to be used in the expert survey; while the third one includes examination and counter-examination. Often, in trials, the three experimental phases are concentrated in one single stage (Giarda and Spangher 2007, p. 1640). Sometimes, the first two argumentative experiments are mixed and confused in one single experiment, or are completely omitted. In short, sometimes, questions are not asked, the parties passively listen to the experts' reports, without having the opportunity to put questions, and facts for examination and counter-examination are not even determined. In such cases, what Perelman calls "topic individuation" is missing (Perelman and Olbrechts-Tyteca 2001, p.89). Missing topics lead the judge to take the expert's report as it is, without cross-examination, thus inevitably getting into fallacy of conditional transposition. It is, therefore, necessary to avoid concentrating the three experimental phases, leaving them separate, since they can express their epistemological charge just in their individuality.

Let us examine the first argument-operational-conjectural experiment. The trial parties can check the scientific result comprehensibility. How can they do it? By means of a first reasoning procedure, made of conjectures on the understandability of scientific

evidences. The parties must agree on the understandability. Otherwise, the Judge must appoint a new expert. So, there is a procedure that allows to eliminate he scientific language indeterminateness, through an operation forcing the newly-appointed expert to give a more precise meaning to the scientific symbol, and, consequently, to scientific evidence, that is translating it into a sign, removing its intrinsic irrationality; in a word, a new trial topic and operational moment is started with the appointment of a new expert, to operationally clear up technical and scientific results, translating them into common language (Pieretti 1969, p. 75).

If we admit that the argumentation of the person called to decide plays also a constructive role, as Perelman maintains (Perelman 1966, p. 519), we can rightfully turn to auxiliary interlocutors, determined by the nature of the matter they are concerned with, in order to remove obstacles to the comprehensibility of trial results.

As a matter of fact, so as to let rhetorical argumentation develop (Perelman 1979, p. 68), on the one hand, the speaker must take into consideration the audience consent, while, on the other hand, the audience must listen to the speaker. The person who is advancing a thesis and the people he is trying to convince must be a community, since they both are concerned with the same problem.

In a word, according to Perelman's opinion, if he wants his speech to be effective, the speaker must adapt himself to his audience. What does "adapting" mean, it being a specific requirement of argumentation? Basically, it means that the speaker can choose as a starting point only a thesis accepted by his audience. To avoid risk of failing his mission, the speaker must start exclusively from preliminary statements that already obtained sufficient consent. Only solidarity between preliminary statements and the thesis you are trying to impose leads to consent (Perelman 1979, p. 32). To come to argumentation field, that is to final discussion, scientific data cannot be used—with a view to correct argumentation, in order to come to a good choice, as Perelman tries to point out (Perelman and Olbrechts-Tyteca 2001, p. 127)—without prior conceptual processing, giving the scientific data a meaning and making them necessary to the reasoning development. Argumentation study makes us take into account not only data selection, interpretation and meaning, but also the way we use them. Therefore, though comparing different points of view, argumentation must develop action principles that can be commonly accepted. To have real argumentation, there must be real spiritual community. As Perelman seems to suggest, if "enlightened" judge is the judge who takes his decision, after listening to the pros and cons, the address by defence counsel cannot be taken out of its context, that is the address by prosecution. In a relativist cultural background, pros and cons are non independent on each other, since they are continuously integrated by newly arisen systems (Perelman 1979, p.87).

The way they are proposed, technical determinations, with their burden of science and subjectiveness, cannot be really used, managed and moulded by parties. Scientifically complex notions imply difficulties, whose solution requires conceptual organization and a decision on the way they must be interpreted in a concrete case. In such an epistemological context, grafting operational definitions, operational translation of scientific results, and by argument-operational-conjectural experiment seems to be explicitly called for, not only to avoid ambiguity and imprecise conceptual definition, but also to translate scientific results into a common language. So, to understand the meaning of scientific results, it seems to be reasonable trying to know the conditions in which the

terms are used. Operational approach (Buzzoni 2008, p.65) can still be a method that allows avoiding obscure, ambiguous and contradictory notions. Introducing an operational phase, within trial dynamics, the meaning of a concept cannot transcend the operations implied in its determination; subsequently, no concept can be defined once and for all, nor can it be valid in any context and under any circumstances; therefore, the definition operational result cannot be foreseen until examination is completed through the argumentative study in the parties cross-examination. Discrimination plays a fundamental role in the process of clearing up scientific evidence. As the discrimination process goes on, the various aspects of a concept, previously undifferentiated, become ever more well defined, while assuming as conclusion of discrimination process, that is specifying by operations, the moment when an agreement is found on the meaning to be given to a particular concept, and this can happen only through argumentative process. Obviously, after this experimental phase is completed, you should listen again to oral reports (operationally translated), asking questions, and making conjectures in order to check comprehensibility. Some problems: how far should we go into operational translation? Is there any risk of not being able to stop the translating process? It is true that here we are not trying to construct a theory with trial meaning, nor do we pretend that the meaning does not imply other operations. Perelman himself maintains that the rationality of argumentation consists in the possibility of continuous critical revision of its results (Perelman 2001, p. 128). Carrying out our analysis, we go as far back as the goals we are aiming at require and we structure concepts in operational terms, that experience suggest to be simple enough for our goals. It is up to the judge to avoid endless regression.

Often, in trial experience, we find scientific expressions that cannot be understood by most people. For instance, the expression “we are in the presence of Low Copy number DNA.” The proposition “Low Copy Number DNA” expressed, according to strict scientific schemes, can be operationally translated into “those DNA quantity that, in different repetitions of the same sample, gives such variations as not to allow the genetic profile determination.”

4. THE SECOND ARGUMENT-CONJECTURAL EXPERIMENT

Once the translation procedure is completed, the second argument-conjectural experimental phase, plays its role; i.e. a dialectic trial phase, where the parties, all the parties, following the principle of an adversarial process, can examine the content of the expert’s report “operationally translated” and provide conjectures aiming at singling out the facts on which examination and counter-examination will be carried out during the third experimental phase. This is a trial phase inviting to the procedure-conjectural reasoning, to awaken suspicion, clearly aiming at a constructive finality starting from the cause in order to reach the effect, starting from the conjectured effect in order to reconstruct its cause (McLuhan 1967, p. 3).

Let’s ask why we have to resort to a second experimental phase. At this point, we really wonder what is missing in order to not fall again into fallacy of conditional transposition. We have in fact scientific results which are now understandable, at disposal of the parties, but the examination of such results has to comply with a specific prescriptive agreement, must be carried out on specific facts (according to the rules in

force, the expert survey must be performed by means of answers concerning specific facts). What is the risk incurred in case we do not single out specific facts and, therefore, conjectures are not addressed to such scientific-operational results? If specific facts were not found, scientific results could not be used and we would therefore fall either in the free convincement of the judge or in the fallacy of conditional transposition. Let's go back to Perelman's teaching (Perelman 2001, p. 48). All reasoning aims at causing or increasing minds assent to the thesis submitted for approval. A reasoning is effective only if it is able to increase such assent intensity, inducing listeners to act according to the expectation (being the matter either of positive action or abstention), or at least creating in them an aptitude to the action, which will appear at the appropriate moment. The reasoning has than a double purpose: from one side aims at obtaining listeners assent to the thesis submitted by the orator; from the other side, by means of the assent possibly obtained, it intends to provoke an action, or a mood to act, in the listeners. The reasoning theory does not exhaust its meaning through discussion and verbal assent, but extends it also as far as the action is concerned. All reasoning, any way, implies a preventive selection attributable to the temporality too. Finally, there are time and space limits established by very strict procedure rules or convenience rules, and especially by the attention the listeners can and want to pay to the orator.

Let's suspend for a while our analysis, and let's dwell upon the example given by Doyle in one of the famous stories of Sherlock Holmes (Doyle 1952). Holmes finds a match drove in into the mud. Watson lets him notice that it was impossible to see it without looking for it. Holmes answers back that it is true, he had thought the match should be there. Holmes does not confine himself to merely observing, but he really tests mentally. Holmes looks for the match because he already imagined that the thing proceeded in a certain way: he can imagine it because in his mind he already has mentally experimented. This situation recalls what Perelman defines intimate deliberation (Perelman and Olbrechts-Tyteca 2001, p. 8), and also recollects Polanyi (Perelman 1979, p. 243), who stressed how scientists spend their life guessing correctly.

Let's now go back to our question. We saw that 1) if specific facts were not found, scientific results could not be understood and used and we would therefore fall either in the free convincement of the judge or in the fallacy of conditional transposition. In fact: without finding specific facts to be submitted to the expert survey, without making conjectures, we would go to the third experimental phase, having no possibility to carry out examination and counter-examination; 2) every reasoning implies a preventive sorting out due also to the temporality. Perelman underlines the existence of time and space limits (Perelman 1979, p. 22), imposed by very strict procedure rules. The search of specific facts and their preventive sorting out, which is necessary and subject to time factor, is achieved by means of the so said mental experiment, through which the parties give birth to conjectures and consequently to specific facts. Mach says that we experiment through thoughts, because it is cheaper (Buzzoni 2004, p. 140), as mental representation of the things is easier available than things themselves. Well, if from one side the real experiment precedes the mental one both logically and temporally, as previous real experiences are required before formulating mental experiments, from the other side it is true that the economy principle is the source generating the mental experiment. From this point of view the real experiment follows the mental one, and the first must be considered the natural extension of the latter (Buzzoni 2004, p. 140). Cattani

points out that the conjecture represents a merely constructive operation (Cattani 2002, p. 416) and recalls Plebe's teaching, asserting that the conjecture rhetoric art consists in building (even mentally) a hypothesis or in demolishing it. It is not therefore a properly inductive or demonstrative art. It is better a constructive art, pertaining for this reason to the invention, which devises assumptions and fabricates them in the best way possible (Cattani 2002, p. 416).

5. CONCLUSION

By means of the mental experiment, the parties denote the specific facts, their conjectures, and complete the second argument conjectural experiment, which will be followed by the real experiment, the third experimental phase of examination and counter-examination. The mental experiments are useful for the Perelman's preventive selection and for perfecting the reasoning field. All this allows to fully overcoming the fallacy of conditional transposition, after having singled out the specific facts to talk about, inserted such facts in the third experimental phase and terminated this phase.

A argument-operational-conjectural phase is fallible, but it represents the path we should follow, in order that the Judge can avoid to follow into fallacy and can decide about what, at present, he must accept on the basis of the information he owns; argument-operational-conjectural experiments can change according to new information and further thinking, but at any time they represent the result of the efforts aiming at distinguish truth from error; therefore conjectural argumentation does not produce a simple knowledge (Musgrave 1995, p. 357) but a complete cognitive process to reach a reasonable belief, a possible judgment beyond any reasonable doubt.

Link to commentary

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