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DISCERNING TRUTH FROM DECEPTION:

THE SINCERE WITNESS PROFILE

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Abstract

During the last twenty years, we have assisted to a growing interest in the detection of verbal cues under deception. In this context, we focused our attention on the *truth vs. deception* topic in adults. In particular, we were interested in discrepant findings concerning some verbal indicators. The aim of the present study was to investigate whether different experimental designs may yield different results regarding the presence or absence of CBCA criteria. Forty participants were shown a video of a robbery and were asked to give a truthful and a deceitful statement of the criminal event. The participants' performances were recorded in order to analyze content of the reports. Results showed more changes in verbal behaviour under within-subjects design compared to between-subjects one, though the presence/absence of some criteria was the same across the two statistical procedures. The different results yielded by between- and within-subjects analyses can provide some hints as regards the discrepancy in deception literature on verbal cues. Implications for applied settings are discussed.

Keywords: Credibility, Criteria-based content analysis (CBCA); Deception; Forensic Psychology; Truth; Verbal cues.

Resumen

En los últimos veinte años hemos asistido a un creciente interés por la detección de la mentira por medio de aproximaciones verbales. En este contexto centramos nuestra atención en la discriminación entre verdad y mentira en adultos. En particular, nos interesamos en los resultados discrepantes en relación con algunos indicadores verbales. Por ello nos planteamos un estudio para investigar si el uso de diferentes diseños experimentales puede proporcionar resultados diferentes sobre la presencia o ausencia de los criterios del CBCA. A cuarenta participantes a los que se les mostró un vídeo de un robo, se les pidió prestaran una declaración verdadera y otra falsa de este acto. Estas declaraciones fueron grabadas para ser sometidas a un análisis de contenido. Los resultados mostraron más cambios en el comportamiento verbal cuando se procedía con diseños intra-sujeto que cuando eran inter-sujetos, aunque la presencia/ausencia de algunos criterios era la misma bajo ambos diseños. El papel mediador del diseño en los resultados puede explicar la discrepancia en la literatura sobre el engaño. Finalmente, se discuten las implicaciones de los resultados para la práctica profesional.

Palabras Clave: Credibilidad, Análisis de contenido basado en criterios (CBCA), Mentira, Psicología forense, Verdad, Registros verbales

Introduction

Since the eighties, we have witnessed to a growing interest for deception and its detection in the field of psychology and law. An impressive corpus of studies has traditionally investigated physiological, nonverbal and verbal behaviour signs in order to evaluate if they could discriminate between liars and truth tellers (for reviews, see Brewer & Kipling, 2005; DePaulo *et al.*, 2003; Vrij, 2005; Sporer & Schwandt, 2006, 2007). Nevertheless, research on this topic has proven quite difficult and results are often disappointing: to date, no single cue (physiological, behavioural or verbal) has been found to be uniquely related to deception. Of course, this topic is central in the legal area, where it is critical to establish the witnesses' reliability: indeed, judges, lawyers and prosecutors frequently have to decide about the reliability of the witnesses, a crucial assessment that can strongly affect the course of the trial as well as seriously influencing the verdict (e.g., De Cataldo & Gulotta, 1996). Thus, legal sciences could greatly benefit from the acquisitions of psychological sciences in the field of deception behaviour.

It is well-known that, in forensic field, witnesses' statements prove very often to be decisive evidence to verdict. According to this, the possibility to catch a liar by analysing his/her speech would be crucial. Anyway, *verbal behaviour* under deception has been historically explored to a lesser extent compared to nonverbal and physiological cues. As a matter of fact, nonverbal behaviour has been believed as unlikely to be manipulated under deception, thus it has received more attention in literature compared to witnesses' speech that, in turn, it is considered as more controllable by liars and less reliable (e.g., Vrij, 2000). Studies focused on the general verbal characteristics of deception, revealing that some verbal indicators are easier to be found in false statements rather than in true ones (e.g., more negative sentences, less

plausible answers; DePaulo, Rosenthal, Rosenkrantz, & Green, 1982; Cody, Marston & Foster, 1984; Stiff & Miller, 1986; DePaulo *et al.*, 2003). Furthermore, research on verbal cues to deception has focused on the development of techniques for the analysis of verbal statements veracity. Probably, the most popular and widely used instruments of witness credibility are the Reality Monitoring (Alonso-Quecuty, 1992; Sporer, 1997) and the *Statement Validity Assessment* (SVA; Steller & Köhnken, 1989). The fundamental assumption of Reality Monitoring (originally developed by Johnson and Raye; 1981) is that memories based on perceptual processes differ from memories based on internal processes (i.e., memories of real events are likely to contain more perceptual, contextual and affective information whereas those based on imagination are expected to contain more cognitive operations; Johnson, Hashtroudi, & Lindsay, 1993).

To date, SVA is probably the most commonly used technique to assess witness's statements. This technique is a diagnostic procedure that consists of three stages: in the first one, the witness' testimony is gathered through a semi-structured interview; in the second stage, the credibility of the statement given during the interview is systematically assessed; in the third stage, the correctness of the two previous steps is verified through a check-list (i.e., were witness correctly interviewed? was the statement biased?). Actually, SVA assessments are accepted as evidence in some American courts and in some Western European courts (e.g., Germany, The Netherlands, Sweden; Vrij, 2005).

The second stage of SVA is particularly relevant because statements are systematically evaluated to decide if they refer to events that are really happened. Such operation is performed through a particular content analysis tool called *Criteria-Based Content Analysis* (CBCA; Steller & Köhnken, 1989; Porter & Yuille, 1996). The CBCA is based on the *Undeutsch hypothesis*, according to which a statement derived from

memory of an actual experience differs in content and quality from a statement based on invention or fantasy (Undeutsch, 1967; 1982). Undeutsch was the first to describe a list of criteria that could be used to assess credibility of statements (Vrij, 2005). Subsequently, such criteria were refined and integrated into a formal assessment procedure, namely, SVA (e.g., Köhnken & Steller, 1988; Raskin & Esplin, 1991; Steller, 1989).

Table 1. A brief description of the CBCA Criteria.

GENERAL CHARACTERISTICS
1. Logical structure. The statement essentially makes sense: it is coherent and logical and the different segments fit together.
2. Unstructured production. The information is scattered throughout the statement instead of mentioned in a structured, coherent and chronological order. Digressions or spontaneous shifts of focus are present.
3. Quantity of details. The statement must be rich in detail, that is, specific descriptions of place, time, persons, objects and events should be present.
SPECIFIC CONTENTS
4. Contextual embedding. The events are placed in time and location, and the actions are connected with other daily activities and/or customs.
5. Descriptions of interactions. The statement contains information about interactions involving at least the accused and witness.
6. Reproduction of speech. Speech, or parts of the conversation, is reported in its original form and the different speakers are recognizable in the reproduced dialogues.
7. Unexpected complication during the incident. There are elements incorporated in the event which are somewhat unexpected.
PECULIARITIES OF CONTENT
8. Unusual details. Details of persons, objects, or events which are unusual and/or unique but meaningful in the context.
9. Superfluous details. The witness describes details in connection with the allegations which are not essential for the accusation.
10. Accurately reported details misunderstood. Witness speaks of details that are beyond his/her comprehension.
11. Related external associations. Event or conversations, relative on the sexual abuse, verifying in a different circumstance.
12. Accounts of participant's mental state. The witness describes feelings or thoughts experienced at the time of the incident, as well as reports of cognitions, such as thinking about how to escape while the event was in progress.
13. Attribution of perpetrator's mental state. The witness describes her or his perceptions of the perpetrator's feelings, thoughts or motives during the incident.
MOTIVATION-RELATED CONTENTS
14. Spontaneous corrections. Corrections are spontaneously offered or information is spontaneously added to material previously provided in the statement.
15. Admitting lack of memory. A witness admits lack of memory by either saying "I don't know" or "I don't remember" or by giving a more extensive answer.
16. Raising doubts about one's own testimony. The witness expresses concern that some part of the statement seems incorrect or unbelievable.
17. Self-deprecations. Descriptions of some behaviour like inappropriate or inadequate that have facilitated the sexual abuse.
18. Pardoning the perpetrator. The witness tends to favour the alleged perpetrator in terms of making excuses for the alleged perpetrator or failing to blame the alleged perpetrator.
OFFENCE-SPECIFIC ELEMENTS
19. Details characteristic of the offence. Witness describes events in a manner in which professionals know that certain crimes typically occur.

Trained evaluators perform CBCA analyses by judging the presence or absence of 19 pre-established criteria grouped in five macro categories (see Table 1).

Usually, a score corresponding to 0 (absent), 1 (present) or 2 (strongly present) is assigned to each criterion. The presence of each criterion strengthens the hypothesis that the account is based on genuine personal experience. In other words, greater is the presence of these criteria in a statement greater will be the probability that the statement is truthful (but see critical studies on the difference between real and false account topic; e.g., Bekerian & Dennett, 1992; Manzanero, 2006; Manzanero & Diges, 1996). Anyway, it should be noted that the absence of criteria does not necessary mean that a statement is deceitful and fabricated. In such terms, CBCA could be considered a “truth detector”, because it looks for cues more likely to occur in truthful statements rather than cues to deception.

The CBCA was originally conceived as a tool to establish the credibility of child witnesses' statements in trials for sexual offences. Field studies have only dealt with the efficacy of the tool in minor victims of alleged violence obtaining encouraging results (Raskin & Esplin, 1991; Lamb, Sternberg, Esplin, Hershkowitz, Orbach, & Hovav, 1997). However, several authors have argued that CBCA could also be used to assess the testimonies of adult suspects or witnesses who talk about issues other than sexual abuse (e.g., Köehnken, Schimossek, Aschermann, & Höfer, 1995; Ruby & Brigham, 1997): according to them, the underlying Undeutsch hypothesis is not restricted to such cases. Indeed, Akehurst and colleagues (2001) and Vrij and colleagues (2002) directly tested age difference by including statements from both adults and children and found higher total CBCA scores for truth tellers than for liars in both children and adults, thus supporting the assumption that CBCA ratings are not restricted to statements of children.

CBCA is the core of the SVA and it is not surprising that research has mainly focused on the accuracy of its analyses. Most of the studies has revealed that truthful statements obtain higher total CBCA score than false ones (for a meta-analysis of 37 CBCA studies, see Vrij, 2005). According to the main findings of several reviews of verbal (and nonverbal) cues to deception, some criteria appear to be diagnostic in discriminating truth tellers from liars: criterion 1 - *Logical structure*, criterion 2 - *Unstructured production*, criterion 3 - *Quantity of details*, criterion 4 - *Contextual embedding*, criterion 6 - *Reproduction of conversations*, criterion 14 - *Spontaneous corrections*, criterion 15 - *Admitting lack of memory* (DePaulo *et al.*, 2003; Vrij 2000, 2005). However, certain criteria are supported by the findings of all the reviews (e.g., criterion 3), while others not [e.g., criterion 1, supported in DePaulo and co-workers (2003) as measured by effect size estimate; not supported in Vrij (2005) as measured by supporting studies/total number of studies ratio]. In such terms, several CBCA criteria have received only partial support; furthermore, some criteria have not been studied in depth because of difficulties in examining them in laboratory settings (e.g., criterion 17, *Self-deprecation*) or because they are not so easily applicable to experimental materials (e.g., criterion 7, *Unexpected complications during the incident*, could not present in the experimental film used during a research). Anyway, it should be noted that the support for CBCA criteria is striking when compared with research into nonverbal indicators of deception, in which the findings are much more erratic (see Vrij, 2000, for a review of such research). Thus, some CBCA criteria received a relatively strong support because they were found in many truthful statements; anyway, other criteria showed contrasting data (e.g., Vrij, 2005). Such findings can be taken into account by three processes that can influence lying: emotion, content complexity and attempted control (e.g., Brewer & Kipling, 2005; Ekman, 1985; Vrij, 2000; Vrij, Edward, Roberts, & Bull, 2000; Vrij &

Heaven, 1999; Zuckerman & Driver, 1985). For instance, truth tellers could be more likely to give their account in *unstructured ways* when they talk about emotional events, or details could be more present in truthful statements because they may be too difficult to fabricate (Vrij, 2000). Moreover, conflicting findings on some criteria can depend on the particular conditions in which lie is fabricated, such as prepared vs. unprepared lie, motivation, stake (for a review, see DePaulo et al., 2003). Anyway, we can argue that other factors could explain verbal contrasting data.

In our opinion, one aspect that could contribute to shed lights on conflicting results is the methodological approach employed in experimental studies. Usually, deception works use a between-subjects procedure: in this condition, two different groups, that is, truth tellers and liars are compared on verbal (and nonverbal) cues to deception. However, this method might not consider some intervening factors: during deception, some people could use a specific behaviour while others could show a complete different verbal (and nonverbal) behavioural pattern. Thus, we suggest that some experimental results might have been affected by individual differences regarding deceptive behaviour that, on the contrary, could be hold constant by within-subjects comparisons. The influence of methodological design in deception research has been recently addressed by two general review works performed by Sporer and Schwandt (2006, 2007). The authors have actually revealed that experimental design is a moderator variable of the association between nonverbal behaviour and deception. Specifically, they found that within-subjects designs are more sensitive to changes in nonverbal visual indicators (facial expression or bodily behaviours; Sporer & Schwandt, 2007), whereas between-subjects ones are more sensitive to changes in paraverbal cues (aspects accompanying speech, such as speech errors, pauses or pitch; Sporer & Schwandt, 2006). It should be noted that no verbal indicators were investigated in these

two meta-analyses. The authors did not provide any accounts for the differences in effect sizes as regards within- vs. between-subjects designs, arguing that no causal explanation can be derived from meta-analytic data (Sporer & Schwandt, 2007). Nevertheless, experimental method seems to yield different directions of effect in deception studies. According to this, we further argue that it could be interesting to compare within- and between-subjects analyses as regards verbal behaviour in order to investigate if different statistical procedures could yield different results about the presence or absence of some CBCA criteria (similarly to nonverbal behaviour findings). In such terms, it could be relevant to perform direct experimental analyses with different experimental designs assessing the same overall sample.

To sum up, we decided to focus our attention on the *truth vs. deception* topic in adults. In particular, we were interested in discrepant findings concerning some verbal indicators. The aim of the present study was to investigate whether certain CBCA criteria can be found or not in statements on the basis of different statistical procedure adopted. Specifically, we decided to perform an experimental study in order to analyse if within- vs. between- subjects' analyses can be one of the aspect that could be considered to understand the difference in results on CBCA criteria found in the literature. To date, no study has explored if the presence or not of the various criteria can also be associated to the specific methodological analysis used; in general, we dealt with the following question: "What happens if deceptive behaviour is studied performing within-subjects design analyses in comparison to between-subjects ones on the same sample?". We predicted that a within-subjects design would allow to find more significant differences in verbal behaviour; indeed, given that individual differences were held constant (e.g., intelligence, social skills, tension), it would be more likely to find the presence of CBCA criteria if differences in deception

behavioural patterns were under control. In particular, by investigating people both telling the truth and lying, it was possible to compare truthful statements vs. false ones partialling out personal variables that could intervene during truth and deception; according to this, verbal behaviour would not be affected by individual differences thus favouring CBCA criteria to be found. On the other hand, in accordance with Undeutsch hypothesis (i.e., truthful, reality-based accounts differ significantly and noticeably from unfounded, falsified, or distorted stories), we expected that overall CBCA score would be higher in the truthful statements compared to the deceitful ones, independently from within- vs- between-subjects analyses.

We decided to use all testable criteria according to our materials, even those that have not received consistent support as diagnostic cues to truthful statements in literature (e.g., criterion 16, Raising doubts about one's own testimony) considering that the agreement on them is not yet complete and, anyhow, mostly based on between-subjects design studies.

Method

Participants

Forty students (19 females and 21 males), from the Faculty of Psychology of the University of Bologna, were recruited to take part in the experiment. They were aged between 20 and 31 years, with a mean age of 26.52 years ($SD = 5.43$).

Materials and experimental design

In order to evaluate verbal cues, we used a video-recording, approximately 2 minutes long, about a robbery. Specifically, the film depicted a supermarket car-parking and the arriving of a pick-up; some hooded and armed men get down the pick-up and assault a security van; unexpectedly, two plainclothes policemen get down a parked jeep and a gun battle between robbers and policemen begins; one of the robbers tries to come up the pick-up holding a bag stolen from the security van, but he/she is shot by one of the policemen; another robber tries to get back the bag, but he/she drops it at once under the policemen's fire and comes back to the pick-up, leaving at high speed.

Procedure

The participants performed the task individually. They were informed that they would watch a video and that they would be interviewed twice about it: in one case, they had to recall what they had seen (Truthful Condition), while in the other one they had to lie about the film (Deceitful Condition). The order of the interviews was counterbalanced. Specifically, in the Truthful-Deceitful Condition, the experimenter encouraged the participants to report what they had actually seen and everything they remembered about the video. They were given 5 minutes prior to provide their statement: this period of time allowed the recollection of the event to become consolidate in the participants' memory. Once participants finished their recollection, they were asked to provide a false statement; specifically, the instructions provided to them were as follows: *“Now you have to imagine a situation in which you have been seriously threatened and, for this reason, you are forced to provide a false statement. Actually, people who threatened you are involved in the robbery and fear that the real facts could emerge. The fabricated story has to be as reliable as a truthful one; you can provide different version of the facts, changing what you prefer about the event, not*

only details, but also aspects related to the development of the story. Moreover, at the end of the experimental session, you will be provided with a feedback as regards your ability to successfully fabricate a false credible story". This way, we tried to promote motivation to lie. Participants were granted all the time they needed to create the requested deceitful statement: on average, they took 9.21 minutes ($SD = 3.14$) prior to provide their false story. In the Deceitful-truthful condition, participants: 1) took their time to fabricate the deceptive statement; 2) provided their story; 3) waited for 5 minutes; 4) provided the truthful story one.

All the statements were transcribed to perform content analysis on the basis of the CBCA criteria used in this study.

Tools

In our study, we considered 10 out of the 19 criteria proposed by the CBCA. The others were not suitable to the specific experimental setting adopted in this study: some were not present in the videotape (e.g., Criterion 6, *Reproduction of conversations*), others were not noticeable because of the experimental characteristics (e.g., Criterion 12, *Accounts of subjective mental state*: absence of real emotional involvement related to the film). Moreover, Criterion 4 (Contextual Embedding) was excluded from the analysis because time and place of the story of the videotape were too salient: event entirely happened in a supermarket park during daylight, so it was trivial, in our opinion, for both truth-tellers and liars to mention such information. The following criteria were selected:

- Criterion 1: Logical Structure
- Criterion 2: Unstructured Production
- Criterion 3: Quantity of details
- Criterion 5: Descriptions of interactions

- Criterion 8: Unusual details
- Criterion 9: Superfluous details
- Criterion 13: Attribution of perpetrator's mental state
- Criterion 14: Spontaneous corrections
- Criterion 15: Admitting lack of memory
- Criterion 16: Raising doubts about one's own testimony

Two raters independently coded the participants' statements. They received training in CBCA scoring by an expert. They had not seen the videotape and they were blind to the experimental hypothesis. The raters estimated the presence or absence of each CBCA criteria by scoring 0 (absent), 1 (present) or 2 (strongly present). Pearson's correlations were performed between the scores assigned by the raters to each CBCA criteria for the Truthful and Deceitful conditions to identify eventual differences in their judgements. For example, in order to evaluate the correlation between the raters on Criterion 1, we compared the scores assigned to it by rater one and rater two across the eighty versions (40 truthful and 40 deceitful). Raters' agreement among criteria varied between .74 and .81 ($p < .01$).

Results

Within-subjects experimental design

First of all, we performed a two-ways ANOVA for mixed designs with "order" as a two levels between-subjects variable (first vs. second report) and "version" as a two levels within-subjects variable (truthful vs. deceitful) and total CBCA score as dependent variable. There was no significant main order effect [$F(1, 38) = .48, p = .49$] nor interaction between condition and order [$F(1, 38) = .72, p = .40$]. Univariate

analyses performed on each criterion individually did not show any significant main order effect [$F_s < 3.38$, $p_s > .07$] nor interaction between criterion and order [$F_s < 2.84$, $p_s > .10$]. The main effect of “version” was statistically significant, thus the average total score of CBCA significantly differed for the truthful vs. deceitful versions [$F(1, 38) = 38.38$, $p < .001$, $\eta^2 = .50$].

A multivariate analysis of variance (MANOVA) with version as a two levels within-subjects variable (truthful vs. deceitful) and each CBCA criterion score as dependent variables revealed a significant main effect [*Wilk's Lambda* = .30, $F(10, 30) = 6.97$, $p < .001$, $\eta^2 = .46$]. Specifically, the univariate tests showed significant differences on: Logical Structure [$F(1, 39) = 18.35$, $p < .001$, $\eta^2 = .32$], Quantity of details [$F(1, 39) = 28.82$, $p < .001$, $\eta^2 = .42$], Unusual Details [$F(1, 39) = 8.79$, $p < .01$, $\eta^2 = .18$], Superfluous Details [$F(1, 39) = 12.65$, $p < .01$, $\eta^2 = .24$], Admitting Lack Of Memory [$F(1, 39) = 21.69$, $p < .001$, $\eta^2 = .36$]. Table 2 provides the average scores for each CBCA criterion under analysis.

Between-subjects experimental design

In order to perform between-subjects analyses, we solely considered the first version provided by each participant, thus we obtained 20 truthful statements and 20 deceitful ones.

A multivariate analysis of variance (MANOVA) with the version as a two levels between-subjects variable (truthful vs. deceitful) and each CBCA criterion score as dependent variables revealed a significant main effect [*Wilk's Lambda* = .31, $F(10, 29) = 6.52$, $p < .001$, $\eta^2 = .69$]: the average total score of CBCA for the first truthful version was significantly higher compared to the total score of the first deceitful one.

Specifically, the univariate tests showed significant differences on: Unstructured production [$F(1, 38) = 13.23, p < .001, \eta^2 = .26$] Quantity of details [$F(1, 38) = 19.70, p < .001, \eta^2 = .34$], Superfluous Details [$F(1, 38) = 11.68, p < .01, \eta^2 = .23$], Admitting Lack Of Memory [$F(1, 38) = 11.75, p < .01, \eta^2 = .24$]. Table 2 provides the average scores for each CBCA criterion.

Table 2. CBCA criteria indicators average scores as a function of experimental design.

CBCA CRITERIA	Within-subjects design		Between-subjects design	
	Average score		Average score	
	TRUTHFUL	DECEITFUL	TRUTHFUL	DECEITFUL
1. Logical Structure	1.85, SD = .05	1.45, SD = .09	1.80, SD = .41	1.90, SD = .31
2. Unstructured Production	.62, SD = .11	.50, SD = .11	.95, SD = .82	.20, SD = .41
3. Quantity Of Details	1.25, SD = .08	.82, SD = .06	1.45, SD = .51	.80, SD = .41
5. Description Of Interactions	1.02, SD = .10	.90, SD = .10	.85, SD = .74	.90, SD = .64
8. Unusual Details	.52, SD = .10	.30, SD = .07	.25, SD = .44	.45, SD = .51
9. Superfluous Details	.52, SD = .10	.17, SD = .07	.80, SD = .77	.15, SD = .36
13. Attribution of Perpetrator's Mental State	.07, SD = .05	.17, SD = .07	.10, SD = .44	.20, SD = .41
14. Spontaneous Corrections	.87, SD = .10	.75, SD = .10	.70, SD = .65	.95, SD = .39
15. Admitting Lack Of Memory	.85, SD = .13	.27, SD = .08	1.05, SD = .88	.25, SD = .55
16. Raising Doubts About One's Own Testimony	.60, SD = .12	.47, SD = .10	.50, SD = .18	.75, SD = .18
- Overall CBCA score	8.20, SD = 2.94	5.82, SD = 1.99	8.45, SD = 2.30	6.55, SD = 2.13

Note: Results in bold are the significant ones.

Discussion

Discerning between truth and deception in witnesses' statements is a relevant and challenging topic for psychological and legal sciences. One of the main approaches in this field has investigated verbal behaviour. Though verbal cues to deception have been analysed to a lesser extent compared to nonverbal behaviour, findings appear rather consistent and promising (e.g., Vrij, 2000). In our experiment, we dealt with the topic of deception and conflicting findings on some verbal indicators reported in literature. We employed ten out of nineteen criteria of a popular content analysis tool, the CBCA, in order to evaluate their association with deception in function of statistical procedure. Specifically, we expected that within-subjects analysis would allow to find more significant differences in verbal behaviour than between-subjects one. According to this, it would be more likely to find the presence of CBCA criteria when individual differences are held constant. Furthermore, we predicted that overall CBCA scores would be higher in truthful statements independently from statistical analyses.

In accordance with literature (see Vrij, 2005), results of the present study have shown that statement content assessment performed by some CBCA criteria seem useful for detecting truthful statements. The central assumption of CBCA is the possibility to detect some qualitative criteria that, generally, consent to discriminate "truthful" testimonies from "deceitful" ones. As a matter of fact, truthful statements obtained a higher total score compared to false statements. Noteworthy, as we expected, CBCA overall score was not affected by different experimental designs. Anyway, different significant effects were obtained in within- compared to between-subjects analyses. First of all, under within-subjects design, five criteria - Logical structure, Quantity of details, Unusual details, Superfluous details and Admitting lack of memory - were

significantly more present across truthful statements against four criteria under between-subjects one - Unusual production, Quantity of details, Superfluous details and Admitting lack of memory. In accordance with our prediction, within-subjects analysis evidenced more changes in verbal behaviour. In such terms, keeping under control individual differences seems to be relevant when searching for deceptive indicators.

As regards the criteria actually related to the within- and between-subjects analysis, Logical structure and Unusual details became apparent as indicators of truthful statements only when they were studied with participants serving as their own control in within-subjects design, whereas Unstructured production criterion was more present in truthful statements only under between-subjects design. Specifically, it is more likely that the various elements of a truthful story fit together (thus the statement makes sense and appears more coherent) when they are compared to the elements of a deceitful story reported by the same person. Again, it is more likely that a truthful statement appears enriched by descriptions of more unusual, fortuitous and accidental things, people or environmental details only when it is compared with a false one reported by the same person. According to this, Logical structure and Unusual details are strongly dependant to individual differences; given that mostly of the CBCA works was performed by using between-subjects design, our findings could partially take into account why, in the recent meta-analysis performed by Vrij (2005), the percentage of the studies supporting both criteria over the total number of works is only 53. On the contrary, truthful testimonies are reported in a more unstructured way (i.e., not provided in a chronological time sequence) in comparison only to deceitful ones reported by a different person. As regard Unstructured production, we can hypothesize that, according to CBCA assumptions, a truthful story can be actually reported in an unstructured way whereas a false version of the same story can be reported in a structured way.

Nevertheless, when an individual has to provide truthful and false statements (or *viceversa*) regarding the same event, he/she tends to report the second statement in a similar way to the first: according to this, no differences would emerge on production criterion under within-subjects analysis, but only under between-subjects one.

Interestingly, we found some verbal cues that seem to hold significance apart from experimental designs. When asked to tell the truth, participants reported a higher amount of details (criterion 3) and admitted more frequently lack of memory (criterion 15) compared to when they were asked to fabricate a story in both within- and between-subjects analyses. In truthful statements, details were quite frequent: indeed, they appeared to be characterized by specific descriptions of people and objects. Moreover, when telling the truth, participants more frequently admitted to not exactly remember some elements of the event, spontaneously saying sentences like “I do not remember” and “I do not know”. Superfluous details (criterion 9) were also more present in truthful statements independently of experimental design; indeed, they were enriched by descriptions of marginal, peripheral details, not essential to the description of the crime in itself. According to the theoretical assumptions of CBCA (e.g., Köhnken, 1999), the presence of not central information supports the hypothesis that a statement is true: such details are less frequently reported by people who lie just because they are not strictly necessary for their testimonies. Anyway, though such result is coherent with CBCA general assumptions, Superfluous details criterion is not a consistent lie cue according to general reviews (DePaulo *et al.*, 2003; Vrij, 2005).

From an application perspective, it is interesting to underline the CBCA criteria that seem to better characterize the *sincere witness*. Specifically, a reliable witness provides descriptions of events that are clear and detailed, with a particular attention to people and objects present in the environment, and reports superfluous details that do

not modify the meaning of the event but convey his/her actual involvement in the facts and contribute to the greater “vividness” of actual experienced statements. All these “cues to truth” contribute to create a rich statement, that is, a description of an active and dynamic environment. Finally, a reliable witness easily admits to not remember some details, thus recognising his/her story as incomplete and characterized by gaps in its development. Such truth-teller’s profile is quite interesting as regards forensic settings, considering when an individual is usually believed as sincere. As a matter of fact, a witness who omits insignificant and superfluous details, who appears sure and with no lack of memory, is usually judged as reliable. These “naïve” observations are also confirmed in literature (e.g., Akehurst, Köhnken, Vrij & Bull, 1996): generally, people believe that a truthful statement contains few references to unusual and superfluous details and few lacks of memory. Our conclusions do not support such beliefs and “reverse” the common opinion about the reliable witness.

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