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## SERIAL EFFECTS OF EVIDENCE ON LEGAL DECISION-MAKING

Raluca Enescu\* and André Kuhn\*\*

\* University of Hamburg (Germany)

\*\* University of Lausanne (Switzerland)

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### Abstract

The order in which evidence is presented to a criminal court might influence the verdict. This study investigated the serial position effect in a judicial context. 1831 Swiss criminal judges received a filmed mock trial with a specific order stemming from the combination of 3 witnesses: a forensic expert, an eyewitness and an alibi witness. The evidence order was completely counterbalanced and each witness represented a different type of testimony chosen in accordance with the legal practice. If judges rendered their verdict on the basis of the first witness, a primacy effect would be observed. Conversely, if the last testimony would be preponderant, a recency effect would influence their judgment. Results showed a recency effect based on a defence eyewitness whose placement in the last position provoked significantly less condemnations. Furthermore, the probative value estimated by the judges for each piece of evidence was not associated with its serial impact. Results are discussed in relation to legal decision-making and the identification of a central witness mediating order effects.

**Keywords:** decision making; evidence; order effects; criminal trial; verdict.

### Resumen

El orden de presentación de las pruebas ante un tribunal penal puede influir en el veredicto. En este estudio se investigó el efecto del orden de presentación. 1831 jueces suizos de la jurisdicción penal recibieron la recreación filmada de un juicio con un orden específico derivado de la combinación de 3 testimonios: testimonio de un forense, testimonio de un testigo presencial y un testigo de coartada. El orden de presentación de las pruebas fue contrabalanceado, caracterizando cada testigo un tipo diferente de testimonio elegido de conformidad con la práctica jurídica. Si los jueces emitieran el veredicto sobre la base del primer testimonio se observaría un efecto de primacía. Por el contrario, si el último testimonio fuera el preponderante, un efecto mediaría el juicio alcanzado. Los resultados mostraron un efecto de recencia para el testigo de la defensa, de modo que cuando este se colocó al final del juicio, la tasa de condenas fue significativamente menor. Por su parte, el valor probatorio estimado por los jueces para cada una de las pruebas no se asoció con su impacto en el orden de presentación. Las implicaciones de los resultados se discuten en relación con la toma de decisiones legales y la identificación de un testimonio central que medie efectos en el orden de presentación.

**Palabras clave:** toma de decisiones; pruebas; efectos de orden; juicio penal; veredicto.

## Introduction

As a perception or an opinion, a verdict is made up of various components. The Gestalt theory (Koffka, 1933; Lewin, 1935; Wertheimer, 1959) has given rise to a psychology of wholes, summed up in the idea that an entity cannot be defined by the sum of its parts. The distinction between parts and whole means that each unit performs a precise function within an entity. The same part will change its role if it belongs to a different whole or if taken in isolation. Moreover the parts exercise a mutual influence until such time that they reach equilibrium within a stable entity (Guillaume, 1979). The reasoning behind an opinion stems from the way in which its contradictory pieces of information are organised by means of psychological mechanisms such as serial effects (Atkinson, 1977; Baddeley, 1999; Ebbinghaus, 1913), cognitive consistency (Festinger, 1957, 1964; Heider, 1946), anchoring effects (Wagenaar, 1988; Wagenaar, van Koppen, & Crombag, 1993) and heuristics (Gigerenzer, 2002; Kahneman, Slovic, & Tversky, 1982). Opinions about persons, also called social impressions, have similarities with the task of forming opinions about defendants and the acts they might have committed. In both cases, pieces of information will be presented and integrated into a judgment.

The combination of personal characteristics within an impression is directly related to Gestalt theory, since it focuses on how a unified impression can be formed from discrete elements. When two experimental groups read the same terms in different orders of presentation, the resulting impressions differed greatly. They were based on the characteristics presented first and showed the influence of a primacy effect (Asch, 1946). If the first elements were positive, the importance of the negative terms presented thereafter was minimized; if they were negative, the value of the subsequent positive elements was reduced. This effect has been observed afterward in settings such as ability attribution (Jones, Rock, Shaver, Goethals, & Ward 1968), political and social issues (Edwards & Smith, 1996) and health policy (Jonas, Schulz-Hardt, Frey, & Thelen, 2001). Such results were explained by the construction of a reference frame, imposing unconsciously an interpretative direction on subsequent elements anchored to the first impression (Nisbett & Wilson, 1977).

In 1938, Weld and Roff transcribed eleven witness statements of a real trial and read them out to the participants. The assessment of guilt was noted on a nine-point scale after each item was presented. It was observed that the very fact of being charged with a crime in itself constituted an incriminating factor. Thirty-three subjects out of

fifty already judged the defendant guilty after hearing only the charge. This observation is in agreement with that of Schünemann (1983) who obtained more guilty verdicts when the indictment was read than when it was not read before the hearings. Concerning the four orders in which the witness statements were read, a recency effect was observed independently of whether the last witnesses spoke for the prosecution or the defence. Thus, it was the evidence presented at the end of the trial that most strongly influenced the choice of verdict. Although no complete counterbalancing of the witnesses was undertaken, this result shows that the primacy effect observed in a social context is not replicated in a judicial setting and that the same witness plays a different role according to the presentation order of the series.

When the defence and prosecution arguments were presented orally by two persons playing the role of both parties involved in a trial, the later elements were the most convincing (Walker, Thibaut, & Andreoli, 1972). The judicial context differed again from the formation of an impression in which the first piece of evidence had the most weight. In the work of Asch (1946), the pieces of information referred to character traits, that is, stable characteristics also called dispositional elements. A trial lays greater emphasis on the reconstruction of a specific event in which a defendant might be involved, thus providing situational elements. If decision makers choose to attribute the cause of an action to situational rather than dispositional factors, the power of information about stable characteristics provoking a primacy effect would be reduced (Jones et al., 1968), thus increasing the probability of a recency effect.

By changing the order of evidence in mock rape trials, Pennington (1982) observed a primacy effect, which contrasted with the previous results. When the strongest defence witnesses came first, followed immediately by the prosecution ones, the defendant was found innocent more frequently than in the opposite order. But if there was an overnight recess between both types of arguments, the verdict was based on a recency effect, finding the defendant guilty more often. In line with the social impression, primacy has been explained by the construction of a “cognitive frame” based on the first piece of evidence that jurors used to interpret following evidence in a coherent way (Kerstholt & Jackson, 1998). This frame provoked an overestimation of supportive evidence and an underestimation of discrepant information in order to provide a consistent judgment (Lagnado & Harvey, 2008). In the case of a time interval, Pennington (1982) stated that jurors did not remember the first arguments as well as the last ones. This interpretation has been extended by Costabile and Klein (2005) who

showed that the verdict choice of jurors was based on the last piece of incriminating evidence even without time interval. Participants chose their verdict according to the evidence that they best remembered, but the authors provided also the explanation of Kerstholt and Jackson (1998) in cases where early evidence served the construction of a frame and provoked primacy effects. This happened when the researchers did not provide the jurors with background information and when they rated the guilty probability in an end-of-sequence mode.

Interest in the effects of ordering in the legal domain has also given rise to a belief adjustment model following the receipt of new information (Hogarth & Einhorn 1992). In this model, individuals process each piece of evidence sequentially without carrying out a global evaluation of the evidence. Independently of the response mode (step-by-step or end-of-sequence) and of the length of the series, a recency effect was observed, the subjects modifying their opinion according to the value attributed to each new factor. These results supported those obtained in 1938 by Weld and Roff and are consistent with the Bayesian approach defended later by Champod and Taroni (1994) as the ideal way to compute evidence, in which each witness statement modifies the perceived likelihood of an event. In reality, it has been long shown that individuals do not calculate probabilities as per a Bayesian model (Schum & Martin, 1982), but weigh new information against the probability of an event, and then adjust the value in favour of this last factor. This approach corresponds to an intuitive calculation of the mean between two values (Lopes, 1985).

Serial effects have recently been studied in the field of pleas and their influence on the length of the sentence (Englich, Mussweiler, & Strack, 2005). The results showed that anchoring took place in favour of the prosecution, which therefore had an advantage in speaking first, since the length of the sentence passed depended on what had first been recommended by the public prosecutor. According to the authors, this primacy effect could be explained by the fact that the defence based itself upon the details of the charge in order to overturn them, thus placing greater importance on those incriminating elements and on the case for the prosecution. These observations completed the anchoring of judicial decisions, especially towards guilty verdicts, found through an archive study gathering written material in 555 Spanish criminal cases (Fariña, Arce, & Novo, 2002).

The current research aims to draw a parallel between an opinion and a verdict from the perspective of the presentation order of its elements. In view of earlier work

and the emphasis placed on the order of evidence, the hypothesis of a recency effect on the verdict choice will be tested: the nearer to the end of the trial a witness is heard, the more influence he will have on the judgement. It is assumed that judges will carefully examine each piece of evidence, but would forgo the final judgement until they have received all evidence.

## **Method**

### **Participants**

The material was sent to all Swiss criminal judges ( $N = 1831$ ). The German-speaking judges represented 75% of the population, the French-speaking cantons 22%, and the Italian-speaking, 3% of the judges in the country. The judges sitting on the federal benches in Lausanne and Bellinzona were treated separately and the material was provided in all three national languages. Courts in bilingual regions were sent the research material in French and German.

208 judges returned the questionnaire, which represents a response rate of 11%. The linguistic distribution of the respondents is similar to the one of the population: 82% questionnaires in German, 17% in French and 1% in Italian. 72% of men and 27% of women took part in the study, 52% were professional and 48% lay judges (no legal studies and called by the president of a court to judge cases within their fields of competency). The mean age was the response category that listed 40 to 49 years old, their average employment rate in criminal justice was the category from 21% to 30% and the mean professional experience as a criminal judge was the category between 4 and 6 years.

### **Material**

Following encouraging results obtained with a sample of 535 participants from the University of Lausanne (Enescu, 2008), it was decided to test the hypothesis of a recency effect on Swiss criminal judges. The written court case presented to the students was transformed into a 20 minutes film of a mock criminal case. The scenario had been revised by a group of judges who agreed to keep secret the aims of the study. The material was passed in a sealed envelope to each judge by way of the office of the court where they sat. The pack contained an introductory letter describing the general aims of the research. The instructions and a DVD with choice of language were

enclosed. The original version of the film was shot in French and additional versions were dubbed into Swiss German and Italian (330 copies of each order were made). The dubbing and the translations allowed a perfect synchronization with the original language. The names of the characters (judge, witnesses, victim, and defendant) and of the town where the accident took place were adapted to the linguistic region.

The case described a road traffic accident and the defendant was accused of assault through negligence (Article 125 paragraph 1 of the Swiss Criminal Code) and of a second charge of violation of duties in case of accident (Article 92 paragraph 2 of the Swiss Road Traffic Act). Both offences are misdemeanours and the defendant had no prior criminal record. Three witnesses were presented in a real courtroom:

- A prosecution witness: forensic expert who compared samples of paintings on the car of the defendant and on the motorcycle of the victim, he concluded that they were matching with high probability;
- A defence witness 1: council employee, friend of the defendant, he provided him with an alibi by stating that they were having breakfast each day at the time of the accident;
- A defence witness 2: teacher and eyewitness not acquainted with the defendant, he saw a car of a different colour than the one of the defendant.

No prosecutor was present during the hearing, which is in accordance with the Swiss practice in such a criminal case, and a court registrar was seated next to the judge to record the proceedings. At the beginning of the trial, the judge read a resume of the facts, the charges and the prosecution's demand to condemn the defendant and pass upon him a suspended sentence whose severity should be decided by the judge. The defendant chose to appear without a lawyer and explained why he could not have committed the offence because he was at a friend's place at the time of the accident (no guilty plea exists in Switzerland). The victim was then asked by the judge to describe the accident and what injuries he suffered from. The role of the judge is active in the Swiss criminal procedure. He questions the defendant, the victim and each witness in order to clarify their statements. The judge was calling in the courtroom each witness one after the other and introduced him before he presented his testimony. After making sure that neither the victim nor the defendant had additional questions, he ordered the witness to leave the courtroom. The camera filmed each person when speaking (judge, defendant, victim, witnesses) and participants could see that the public gallery was



empty. At the end of the trial, the defendant was asked to speak last and he chose to repeat his presence at a friend's place. The judge decided to retire with the registrar in order to decide the verdict and the sentence if appropriate. The film stops at this moment and the participants proceed with the questionnaire.

The probative value of the incriminating forensic expert was designed to balance with both discriminating witnesses and not to provoke only condemnations. The defence witness who was acquainted with the defendant was meant to have a weaker evidential value than the eyewitness. The expert was supposed to have at least a moderately value, especially because he was incriminating and presenting forensic evidence identifying the defendant's car (Ask, Rebelius, & Granhag, 2008). A pilot study with the same road traffic accident featuring a defence expert and two incriminating eyewitnesses provoked only acquittals. The permutations of the witnesses' appearances led to six orders of presentation corresponding to six versions of the film:

- Order 1: prosecution expert – defence witness 1 – defence witness 2.
- Order 2: defence witness 1 – prosecution expert – defence witness 2.
- Order 3: defence witness 1 – defence witness 2 – prosecution expert.
- Order 4: prosecution expert – defence witness 2 – defence witness 1.
- Order 5: defence witness 2 – prosecution expert – defence witness 1.
- Order 6: defence witness 2 – defence witness 1 – prosecution expert.

The questionnaire related to the film of the case was drawn up in three languages and the following questions were asked:

- Verdict (guilty, not guilty)
- If relevant, the charge upheld
- Sentence imposed if guilty verdict
- Confidence in the verdict on a seven-point scale for each charge: (1) not at all confident, (2) hardly confident (3) not very confident, (4) fairly confident, (5) very confident, (6) extremely confident and (7) absolutely confident.
- Probative value of each witness statement<sup>1</sup> on a seven-point scale adapted from Wagenaar et al. (1993): (1) highly incriminating, (2) moderately incriminating, (3) slightly incriminating, (4) neutral, (5)

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<sup>1</sup> The rating scales were presented with respect to the ordering of the witnesses in the film, aiming to minimize errors in the attribution of the probative values.

slightly exculpating, (6) moderately exculpating and (7) highly exculpating.

- Six socio-demographic questions: age-range (10-year ranges); studies and profession in the case of lay judges<sup>2</sup>; employment rate as a criminal judge (9-year ranges); years of experience as a criminal judge (3-year ranges); sex; location of the court (canton).

## Procedure

Each judge received a DVD containing a mock criminal case presenting three witnesses in one of the six possible orders. In addition, it was of paramount importance not to reveal any other order of presentation of the witnesses. For that reason, the judges of the same court all received the same version of the film, namely with the witnesses in the same order. The first stage involved sending out the copies of the DVD to each court with a criminal division. Approximately 300 units per order of presentation were evenly distributed. An accent was put on correct cantonal and regional proportions for each version of the DVD, and on not sending multiple sets to a judge who was sitting in several courts. The material was sent in November 2006 and a letter of reminder was sent in January 2007. In order to secure a maximal ecological validity, instructions asked to watch individually the trial only once before answering the questionnaire.

Of the 208 answers received, the distribution of the six orders of evidence was in a range of 24-42 judges:

- Order 1: prosecution expert – defence witness 1 – defence witness 2  
(42 judges, 20%)
- Order 2: defence witness 1 – prosecution expert – defence witness 2  
(35 judges, 17%)
- Order 3: defence witness 1 – defence witness 2 – prosecution expert  
(24 judges, 12%)
- Order 4: prosecution expert – defence witness 2 – defence witness 1  
(32 judges, 15%)
- Order 5: defence witness 2 – prosecution expert – defence witness 1  
(41 judges, 20%)

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<sup>2</sup> The judicial organization is independent in each Swiss Cantons (States) and there is no common definition of a lay judge. Researchers agreed on the definition that lay judges are not legally trained and are chosen for specific trials because of their skills.

- Order 6: defence witness 2 – defence witness 1 – prosecution expert
- (34 judges, 16%).

The material was sent to all criminal judges in Switzerland ( $N = 1831$ ). The response rate was relatively low (11%), while in a previous experiment 30% of the judges returned their answers (Kuhn & Jayet, 2005). The period during which the material was sent, November 2006, was probably not conducive to a high response rate. The end of the year is a busy period for the courts and the end of 2006 was particularly so, since the Swiss criminal law (especially relating to punishments) was amended on 1 January 2007 and raised concerns among the judges. The same amendment in the general part of the Swiss penal code made it necessary to send the material before the end of 2006. The punishments imposed after 1 January 2007 would have been difficult to compare with the sentencing decisions found in 2005 by Kuhn and Jayet (Kuhn, 2011).

## Results

17% judges ( $n = 36$ ) condemned the defendant and 83% ( $n = 171$ ) acquitted him<sup>3</sup>. The confidence in the verdict was very high ( $M = 5$ ,  $SD = 1.3$ ,  $N = 191$ ) and the probative value of the witness statements were in accordance with the researchers' expectations: the scientific expert was considered moderately incriminating ( $M = 2.6$ ,  $SD = 1.2$ ,  $N = 206$ ), the council employee - eyewitness - moderately exculpating ( $M = 5.8$ ,  $SD = 1.1$ ,  $N = 206$ ), and the teacher –alibi witness– slightly exculpating ( $M = 5.3$ ,  $SD = 1.5$ ,  $N = 206$ ). The difference between the exculpating scores was significant,  $t(206) = 3.8$ ,  $p < .001$ , and the effect size moderate ( $d = .04$ ), therefore their effect on the verdict was separately tested.

Disparities of the sentence between judges were observed, varying between 2 and 300 days for the same case. The average length of the sentence was 59 days with a mode of 60 days ( $n = 35$ ). Two months of incarceration appeared to be the “ordinary” sentence in this criminal case. Of the 36 judges who condemned the defendant and specified their sentence, 28 passed a suspended sentence.

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<sup>3</sup> The number of judges will henceforth be 207, as one respondent returned an empty questionnaire except for the socio-demographic data.

A recency effect was observed and confirms the hypothesis under investigation. A  $\chi^2$  analysis of the six evidence orders and the verdict choice showed a recency effect (see Table 1) based on a defence witness,  $\chi^2(5, N = 207) = 11.15, p < .05, \phi' = .23$ .

**Table 1.** Counterbalanced Order of Evidence and Type of Verdict Rendered.

Order	Description <sup>a</sup>	Type of value	Guilty	Not guilty	Total
1	pro-def1-def2	observed value	7	35	42
		theoretical value	7	35	42
2	def1-pro-def2	observed value	0	35	35
		theoretical value	6	29	35
3	def1-def2-pro	observed value	6	18	24
		theoretical value	4	20	24
4	pro-def2-def1	observed value	8	24	32
		theoretical value	6	26	32
5	def2-pro-def1	observed value	10	31	41
		theoretical value	7	34	41
6	def2-def1-pro	observed value	5	28	33
		theoretical value	6	27	33
<b>Total</b>			36	171	207

*Note.* <sup>a</sup> pro = expert prosecution witness; def1 = council worker, defence witness 1 and “def2” = teacher, defence witness 2.

When the observed values were compared with those expected independently of the two variables, the second order – which presented the council employee for the defence first, followed by the expert for the prosecution and finally the teacher for the defence – was the only relevant order for interpreting this result.

Due to the low number of verdicts in each category using the six evidence orders, it was decided to merge the orders according to the placement of one specific witness. No attention was paid to the permutations of the two other pieces of evidence,

since the previous results did not show any influence of this factor. The place held by the scientific expert grouped together Orders 1 and 4 (expert in first position,  $n = 76$ ), Orders 2 and 5 (expert in second position,  $n = 76$ ), and Orders 3 and 6 (expert in third position,  $n = 57$ ). The  $\chi^2$  analysis of these three orders of presentation and the type of verdict was not significant,  $\chi^2(2, N = 207) = 1.52, p < .47, \phi' = .09$ , which means that the proportions of convictions and acquittals observed did not depend on the order of the witnesses as grouped according to the position occupied by the prosecution expert.

If the six original orders were merged according to the position held by the first defence witness, the council employee who provided an alibi, he appeared first (Orders 2 and 3,  $n = 59$ ), second (Orders 1 and 6,  $n = 75$ ) or last (Orders 4 and 5,  $N = 73$ ). His position did not influence the choice of verdict,  $\chi^2(2, N = 207) = 4.93, p < .09, \phi' = .15$ .

Finally, when the six original orders were regrouped according to the position of the second defence witness, namely the eyewitness, his testimony came first in Orders 5 and 6 ( $n = 74$ ), second in Orders 3 and 4 ( $n = 56$ ) and last in Orders 1 and 2 ( $n = 77$ ). The result of the  $\chi^2$  showed a significant recency effect of the witnesses order on the choice of verdict,  $\chi^2(2, N = 207) = 6.38, p < .05, \phi' = .18$ .

**Table 2.** Serial Position of a Defence Witness and Type of Verdict Rendered.

Order	Type of value	Guilty	Not guilty	Total
1	Observed value	15	59	74
	Theoretical value	13	61	74
2	Observed value	14	42	56
	Theoretical value	10	46	56
3	Observed value	7	70	77
	Theoretical value	13	64	77
<b>Total</b>		36	171	207

When the defence witness appeared last, 9% guilty verdicts were observed, which is significantly lower than in the first (20%) or middle position (25%). When heard in the first or second place, his influence on the verdict was equally weak. For the

same case and with identical witnesses, the same defendant was convicted in a range of 9-25% due to the change of position of one defence eyewitness.

As verdict is a dichotomous variable, its prediction may be estimated with a binary logistic regression analysis. The previous orders of each testimony were the categorical independent variables. The first position of each witness was chosen as the reference category by simple contrast. If the overall ordering of a witness was significant, his middle and last positions were compared to the first one. The verdict was best predicted by the position of the eyewitness, whose last position significantly increased the odds to acquit the defendant by 2.5 in comparison to the first position. His second place in the series didn't play a significant role in the prediction of the verdict. The orders of the expert and of the alibi witness did not influence the verdict choice. Results showed that a recency effect stemming from the defence eyewitness correctly predicted 83% of the verdicts,  $\chi^2(2, N = 207) = 6.8, p < .05$ .

**Table 3.** Binary Logistic Regression Analysis Predicting the Type of Verdict Rendered.

Variable	B	SE	Wald	p	df	Exp(B)	95% CI
<b>Eyewitness</b>			5.98	.05	2		
<b>Eyewitness 2<sup>nd</sup> position</b>	-.27	.42	.41	.52	1	.76	.33 - 1.74
<b>Eyewitness 3<sup>rd</sup> position</b>	.93	.49	3.62	.05	1	2.54	.97 - 6.65
<b>Expert</b>			2.46	.29	2		
<b>Alibi witness</b>			2.46	.29	2		

Additional  $\chi^2$  analyses provided interesting results, although not connected with serial effects. The influence of the judges' training on the choice of verdict indicated that trained lawyers rendered guilty verdicts less often than expected, while lay judges gave guilty verdicts more often than expected,  $\chi^2(1, N = 203) = 6.64, p < .01, \phi = .18$ . Other analyses comparing professional to lay judges were not significant, as was the interaction between the type of verdict and its confidence. Variables of sex, linguistic region, years of experience, and full or part-time activity in a criminal court showed no significant results.

## **Discussion**

From a criminal system with sentences of imprisonment (immediate or suspended) and fine, Switzerland moved to a system with monetary, community service and imprisonment sentences (suspended or not) on the 1<sup>st</sup> January 2007, limiting custodial sentences of less than six months to exceptional cases (Kuhn, Moreillon, Viredaz, & Willi-Jayet, 2004). The letter of reminder sent in January 2007 had almost no effect on the response rate, only three additional questionnaires being received. The transition to the new criminal law took place at the same time as the sending of the material and might have prevented a greater number of judges from taking part in the study. A second hypothesis for the 11% response rate could be the high participation of Swiss judges in a previous research by Kuhn and Jayet (2005). The results communicated at that time might have been badly received, hindering some people from participating in a new study about criminal trials.

The results showed the presence of a recency effect on the choice of verdict: the proportions of condemnations and acquittals followed the presentation of the last witness (council worker for the defence – expert for the prosecution – teacher for the defence) when all six orders of witnesses were analysed, just as when the six orders were regrouped according to the placement of the teacher. The fact that two witnesses did not provoke any serial effect does not support the belief adjustment model of Hogarth and Einhorn (1992), where the last piece of evidence was always overweighted.

The evidential value of the eyewitness for the defence was significantly lower than the one of the second defence witness, contradicting the researchers' expectations. Nevertheless, it is the former witness that influenced the verdict according to his serial position and not the most exculpatory one. It was also expected that the position of the expert would have an effect on the verdict choice, but he didn't show such an influence. The probative value seemed not to be connected to the order effect of one piece of evidence. The forensic evidence was interpreted in the context of the case and did not lead to a verdict that followed its conclusions. This result differs from the findings of Ask, Rebelius and Granhag (2008) who observed that forensic evidence had more value if it produced incriminating information. A pilot study showed also that a discriminating forensic expert had a drastic effect on the verdicts, which were all acquitting the defendant.

The influence of an expert depends on the credibility, which is based on trustworthiness, knowledge, confidence and likeability (Brodsky, Griffin & Cramer, 2010). The present expert used partly technical jargon and therefore could have been perceived as not likeable, reducing his credibility (Brodsky, Neal, Cramer, & Ziemke, 2009). A limitation of the current study was the lack of information about the credibility of the witnesses. In future research, this characteristic should be measured and a condition in which the expert is a woman added, since gender can influence the impact of such testimony due to role stereotypes and the type of offence to be judged (Schuller & Cripps, 1998).

An explanation of the recency effect of the second defence witness could be that he was considered as the key witness in this criminal case. As the terms used by Asch (1946) in the context of impression formation, a judicial decision making could also rely on the choice of a central piece of evidence or of a key witness who would be the basis of the most convincing story for the events that occurred (Pennington & Hastie, 1986). The order effects might be mediated by the distinction between central or peripheral pieces of evidence, only the former ones producing a recency effect. Since the presentation of prosecution and defence witnesses is usually mixed in the Swiss procedure, the role and the position of one witness – and not of a group of prosecution or defence witnesses - can be determinant in creating the narrative that will be used to choose the verdict (Pennington & Hastie, 1988). To ensure ecological validity, future research could address both the central or peripheral role of a witness appearing in the middle of contradicting ones and the position in the evidence series in order to study the occurrence of a serial effect and its influence on the verdict.

If each piece of evidence produced a preliminary judgment and if the final verdict was made up of the sum of the previous judgments, the result would not depend upon the presentation order of the evidence. The significative effect of the witnesses order on the verdict shows that forming a verdict does not follow an additive process since the proportions of convictions and acquittals vary according to the placement of a witness speaking for the defence.

When the same terms were presented in different orders, Asch (1946) observed that the resulting impressions differed greatly, following a primacy effect: if the first elements were positive, the importance of the negative terms was minimized, leading to a favourable impression. If the first elements were negative, the value of the positive ones that followed was lessened, and the final impression was unfavourable. This serial



primacy effect was not borne out by this research. It is the final element that possessed the greatest influence on the final judgment and not the first one as observed by Asch in the context of impression formation or by Pennington (1982) in a judicial decision making.

The fact that identical elements placed in different positions caused different impressions resulted from the construction of a reference frame following the first pieces of information, which provided an interpretative direction for the later elements (Pennington, 1982; Kerstholt & Jackson, 1998). This explanation, although based on similar results (a different verdict was obtained by changing the order of the witnesses), did not apply in the present case: it is the final witness who shifted the ratio of convictions to acquittals in his direction. The current observations, therefore, were not stemming from a frame of reference based on the first witness, but from the influence of the last witness statement on the choice of verdict. This result could be mediated by the best memory of this piece of evidence or by its centrality. A limitation of the study lays in the impossibility to examine the process underlying the order effects. Future research could investigate this important point by asking the respondents to describe the pieces of evidence and to argument their verdict.

An oral presentation by two people presenting the arguments of the defence and of the prosecution led to a recency effect (Walker et al., 1972) and Insko (1964) also highlighted the influence of a personal testimony on the type of serial effect: the situations in which the witnesses were seen produced a recency effect, while those in which the information was read provoked a primacy effect. A trial belongs to the first category of situation, as did the material used for the present study, which allowed judges to see the witnesses. This aspect might have made the recency effect on the verdict more likely. However, the results of Weld and Roff (1938) also revealed a recency effect using material read out to the participants. Moreover, undergraduates' responses after reading the summary of a mock criminal trial showed a recency effect (Costabile & Klein, 2005; Enescu, 2009).

This study emphasized the effect of the recency on the choice of verdict, which was significantly influenced by the last piece of evidence. The influence of situational factors, which referred to the circumstances in which the offence took place, and the lack of dispositional ones, might have played a role in the results. This assumption would be in agreement with the statements of Jones and Nisbett (1971) for whom only stable dispositional factors give rise to a primacy effect.

The recency effect implies that the choice of the evidence order does lead to a different judgement. An end-of-sequence response mode that is ecologically valid was used and found a defence witness whose position influenced the proportions of condemnations. Is it right to take this knowledge into consideration in the conduct of trials? Pleas are made in a specific order: the public prosecutor speaks first, followed by the prosecution, and then the defence, before the defendant (presumed to be innocent as no plea of guilt exists in Switzerland) has the right to speak last of all. This order stems from a presumption of a recency effect (contrary to the results of English et al., 2005), given that the rights of the defence take precedence over those of the prosecution. Since the results of the studies carried out on the order of witnesses lead towards the existence of a recency effect (except the results of Pennington, 1982), should a similar order in favour of the defendant equally be respected in the choice of the evidence order (the evidence for the prosecution presented before the evidence for the defence)? In Switzerland, the president of the court chooses the evidence order according to the availability of the witnesses and experts. An improvement of the courtroom procedure could state that the choice of the evidential order will, in general<sup>4</sup>, be left to the defence in order to control the consequences of serial effects. The application of such findings in the courtroom is of major importance for the rights of the defendant and needs to be addressed conjointly by researchers and legal scholars.

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<sup>4</sup> Certain pieces of evidence are meaningless unless they are given after previous ones, therefore the court

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should keep control over the order in which the evidence is given.

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