

The Effect of Background Case Characteristics on Decisions in the Delivery Room

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Background. The authors investigated whether obstetricians make different decisions about a medical test case depending on the characteristics of background cases that preceded the test case. **Methods.** Five hypothetical cases were sent to 1247 obstetricians. The outcome of interest was the proportion of physicians who elect to perform a cesarean on a borderline test case, presented with 4 background cases. Participants were randomly assigned to 1 of 3 conditions: 1) pathological background, in which the test case was preceded by abnormal cases, typically requiring cesarean; 2) physiological background, where the test case was preceded by relatively uncomplicated cases, often suggesting a less invasive treatment; and 3) control, where the test case appeared first. **Results.** A significantly higher proportion of respondents chose a cesarean when the test case was preceded by physiological cases (75.4%) than when it was preceded by pathological cases (52.2%). This tendency

was observed among those actively and not actively involved in obstetrics and in physicians with different levels of training. **Conclusions.** A patient's chances of undergoing cesarean section can be influenced by the immediately prior experience of the physician. This study with hypothetical vignettes found that background cases can influence physicians' decisions. The test case was apparently perceived as more grave when it followed uncomplicated cases as compared to when it was preceded by abnormal cases. Such inconsistencies in decision making are unlikely to be fully resolved by expertise, as suggested by the lack of differences between physicians with different training levels. An understanding of such effects may contribute to more informed consideration of unappreciated influences in making decisions. **Key words:** decision making, context effects, cesarean section, placental abruption. (*Med Decis Making XXXX;XX:xx-xx*)

Decisions in obstetric situations are frequently taken with urgency and in the face of significant levels of uncertainty. Decision uncertainty is compounded by the very nature of obstetrics, in which decisions directly affect 2 patients, mother and fetus. Often, as in the case of cesarean section, to ensure superior neonatal outcome, a decision intended to benefit one might be to the physical detriment of the other.

According to the normative view of decision making under uncertainty, decisions tend to be highly

reliable, with specific data sequences leading to consistent choices, particularly among experts. Underlying this is the assumption that people have clear and stable preferences. Behavioral studies of decision making, however, suggest that preferences often are malleable and tend to be constructed in the process of making a decision.^{1,2} As a result, minor nuances in the presentation, availability, or ordering of options can have a significant influence on decisions. One series of studies, for example, has shown that preference between options can shift when additional, albeit undesirable, alternatives are added to the offered set.³ Common to these and related behavioral findings is the observation that practitioners do not always resolve medical decisions through a systematic analysis of benefits and harms. Rather, they tend to resort to intuitive judgments that are heavily context dependent and prone to cognitive bias.^{1,3-5}

The aim of the present study was to gauge the extent to which context effects may be observed in the field of obstetrics, which may be further prone to contextual influence due to the urgency, complexity, and uncertainty inherent in clinical obstetric

Received 26 December 2008 from the Department of Obstetrics & Gynecology, Shaare Zedek Medical Center, Jerusalem, Affiliated with Ben Gurion University, Beer-Sheva, Israel (OS, RR, RRG) and the Department of Psychology and The Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, New Jersey (ES). Revision accepted for publication 25 September 2009.

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DOI: 10.1177/0272989X09353451

Table 1 Study Design: Ordering and Type of Cases Seen in Each of 4 Conditions

Condition	Pathological Backgrounda (40%)	Physiological Backgroundb (40%)	Pathological Controla (10%)	Physiological Controlb (10%)
Seen first	4 pathological cases	4 physiological cases	Test case	Test case
Seen second	Test case	Test case	4 pathological cases	4 physiological cases

a. Pathological cases are cases with abnormal characteristics often requiring intervention.

b. Physiological cases are cases with normal characteristics requiring relatively little intervention.

situations.^{6,7} In particular, our study set out to evaluate the effect of a series of background cases on decisions in the delivery suite. Our hypothesis was that having just experienced a few pathological cases (i.e., cases with abnormal characteristics that resulted in cesarean section), a physician might tend to forego this option when facing a subsequent borderline case. Conversely, following recent exposure to a few physiological cases, cases with little or no abnormal characteristics that typically do not require cesarean section, the tendency to perform a cesarean section might be greater for a subsequent borderline case.

METHODS

Israeli obstetricians, arbitrarily assigned to 1 of 4 conditions, were mailed a questionnaire that consisted of 5 hypothetical obstetrical cases: a test case and 4 background cases. Each case offered 2 mutually exclusive treatment options: “perform cesarean section” or “other treatment,” the latter implying a less invasive procedure. The background cases, although requiring serious deliberation, were constructed to evoke a predictable response from a majority of physicians. The test case, which involved placental abruption and was designed (and piloted among practicing physicians) to evoke no obviously superior management alternative, read as follows:

A 34-year-old healthy gravida 4, para 3 was admitted at term to the delivery room due to lower abdominal pain and moderate vaginal bleeding, which started 45 minutes prior to admission. Maternal blood pressure was 90/60 and pulse rate was 110 per minute. There were regular contractions on cardiotocogram and fetal heart rate appeared normal. A sonogram ruled out placenta previa and showed a singleton fetus in vertex presentation. Pelvic examination revealed cervical dilatation of 4 centimeters and 80% effacement, with moderate vaginal bleeding. Hemoglobin was 8.1 G/dL, and coagulation profile was normal.

The test case was evaluated along with 4 background cases in 1 of 4 conditions: 2 experimental conditions (pathological background and physiological background) and 2 control conditions (pathological control and physiological control; see Table 1). The experimental versions were each sent to 40% of respondents, and the control versions were each sent to 10% of respondents. In the pathological background situation, the test case was preceded by 4 pathological cases, which were designed to evoke a high rate of “perform cesarean section” responses. In the physiological background situation, the test case was preceded by 4 physiological cases, designed to evoke a high rate of “other treatment” (less invasive) responses. In the control situations, the test case was presented first, followed by the 4 pathological (pathological control) or the 4 physiological (physiological control) cases.

Respondents, who remained anonymous, indicated whether they were board certified, junior or senior residents, and actively involved in obstetrics.

RESULTS

Questionnaires were mailed to 1247 physicians (all names on a professional organization’s mailing list), of which 429 replied, for a response rate of 34.4%. Of the respondents, 316 (73.6%) indicated they were actively involved in obstetrics, 101 (23.5%) indicated they were not, and 12 did not specify. Twenty respondents (4.6%) indicated they were junior residents, 37 (8%) were senior residents, and 356 (82.9%) were board-certified Ob/Gyn specialists. Statistical analyses used the Pearson chi-square test. *P* values Table 2 summarizes response frequencies for the test case and the background cases in each of the 4 conditions. In all conditions, the background cases yielded the expected decision distributions, with the pathological cases generating a high proportion of “perform cesarean” responses and the physiological cases generating a low proportion (87% v. 24%, on average, respectively). Also as expected, decisions about the test case in the control

Table 2 Percentage (Proportion) Who Selected Cesarean Section in Test and Background Cases in Experimental and Control Conditions

	Pathological Background	Physiological Background	Pathological Control	Physiological Control
Test case	52.2 (93/178)	75.4 (126/167)	59.1 (26/44)	57.5 (23/40)
Background cases	85.3 (607/711)	26.6 (177/665)	88.0 (155/176)	21.2 (34/160)

Table 3 Percentage (Proportion) Selecting Cesarean Section by Professional Affiliation and Training

	Pathological Background	Physiological Background
Actively involved in Ob	51.9 (68/131)	74.6 (85/114)
Not actively involved in Ob	53.5 (23/43)	80.4 (37/46)
Board certified	53.2 (83/156)	76.7 (99/129)
Residents	42.2 (8/19)	67.9 (19/28)

conditions, where it appeared first, were indistinguishable in the pathological v. the physiological versions for all groups of respondents (59.1% v. 57.5%; P value NS), confirming that, as intended, the background cases had no impact on the test case in these conditions.

On the other hand, a significantly higher proportion of respondents chose to “perform cesarean section” when the test case was preceded by physiological cases, which typically did not warrant a cesarean, than when the test case was preceded by pathological cases, where the cesarean option was popular (75.4% v. 52.2%; $P < 0.001$). In the control conditions, where background cases presumably had no impact, a cesarean section was preferred by an intermediate proportion of respondents (58.3%).

As shown in Table 3, the observed pattern remains nearly identical when those not actively involved in obstetrics are compared to those who are actively involved. In fact, the latter group’s differential tendency to select the cesarean option in the pathological v. physiological background conditions proves highly significant ($P = 0.003$). Further breakdown by level of training shows similar results for residents and for board-certified specialists, whose differential tendency to select the cesarean option in the 2 experimental conditions remained highly significant ($P = 0.001$). The experts’ and residents’ overall caesarean rates (experimental and control groups combined), at 63% and 58%, respectively, were not statistically different. The differences in average cesarean rates between both experimental groups and the control groups did not attain statistical significance. Finally, results were indistinguishable for early and late respondents to our questionnaire.

DISCUSSION

Perhaps the most fundamental insight of behavioral decision research has been the largely unappreciated impact of context on decision. People often do not have clear and well-ordered preferences; instead, they tend to construct their preferences in the context of a decision, and the construction of preference is influenced by a variety of factors, including the nature of available alternatives and the salience of recent examples that come to mind.² Of particular relevance to the present findings are contrast effects, which are ubiquitous in perception and judgment. The same circle appears larger in the midst of smaller than larger circles, consumer products are more attractive in the context of inferior alternatives, and stimuli are judged weaker in the presence of stronger stimuli and stronger in the presence of stimuli that are perceived weaker. Contrast effects have been documented in domains ranging from odor, temperature, color, weight, sweetness, and loudness to judgments of physical attractiveness and criminality.^{7–10}

Sequential judgments, such as those elicited in the present study, can generate potentially conflicting tendencies—contrast or assimilation.^{9,11} The latter refers to the tendency to respond in a similar fashion later as one had done to earlier experiences. A well-documented instance of assimilation, known as a problem-solving set, arises when an earlier application of a solution leads a person to apply a similar solution in a new problem-solving situation. The tendency for past habits to hinder problem solving, however, dissipates as people acquire more general problem-solving techniques and is unlikely to characterize the presumably more flexible and expert approaches of professional physicians.¹²

Among other things, the occurrence of assimilation depends on whether the objects of judgment are perceived as parts of a greater whole or as distinct occurrences. The former tends to promote assimilation, whereas distinct instances, which characterized the context in which our physicians' decisions were made, promote contrast.¹⁰ Assimilation also depends on whether respondents are aware of the potentially biasing influence of prior exposure, which may prime them to produce a particular response.¹³ Whereas primes that are not remembered can lead to assimilation, primes that are noticed can motivate an attempt to correct for potential bias, yielding adjustment in the opposite direction and resulting in contrast effects.^{14,15} It is possible in the present study that some physicians' decisions regarding the test case were partly shaped by an actual attempt to contrast it with what appeared like very different preceding cases.

In effect, the contrast with preceding cases influenced the perceived gravity of the test case, making it appear more serious following the physiological cases and less grave in the context of greater pathology. This is consistent with other studies that have shown contrast effects in severity judgments. In one well-known study, for example, ratings of the importance of recycling were inversely related to the perceived importance of other social issues: recycling was rated less important after people had considered abortion laws than after they had considered pet leash laws.¹⁶

Interestingly, the pattern we observed may have further benefited from people's expectations that short sequences generated by random events resemble longer ones.¹⁷ A fair coin that falls *heads* on a few consecutive tosses is judged "due" to correct such deviation and fall *tails*, although such streaks are in fact not "self-correcting" and have no implications for ensuing tosses. Although a coin is expected to fall heads 50% of the time in the long run, people mistakenly expect such distribution also in short sequences. In a similar fashion, if cesarean sections are anticipated, say, approximately 20% of the time, then physicians might intuitively expect approximately that rate to be observed on a daily basis, propelling them to resolve nuanced decisions in a "corrective" direction.

The observed patterns highlight an inherent tension. On one hand, experienced decision makers typically feel they make reliable judgments, unlikely to be altered by irrelevant contextual nuances. On the other, there is plenty of evidence showing decisions to be influenced by background, expectations,

and other aspects of the context of decision. The present study serves to highlight the potential impact of seemingly incidental features in the consequential decisions of experts. In particular, our findings suggest that a patient's chances of undergoing cesarean section may be determined partly by the nature of a few prior cases the physician happens to have treated (and, possibly, by the availability of cases in memory).¹⁸

Due to the relative paucity of medical residents, the present study was underpowered to assess whether experts were less prone to contextual influence than novices. However, decision patterns of the kind documented here are the result of human information processing and unlikely to fully dissipate with expertise.^{5,19-22} Furthermore, although the decisions investigated in the present study were hypothetical as opposed to real, they provided straightforward renditions of real situations, and there is at least good reason to expect that corresponding real decisions would show similar contrast effects. An increasing number of studies in behavioral decision research have documented compelling real-life replications of patterns that were originally documented with hypothetical decisions.^{5,20-24}

Although context-dependent preferences are unlikely to go away, greater awareness of and insight into the factors that impinge on decision making may lead to improved decisions.²⁵ Awareness of the patterns documented in the present study, for example, may encourage more nuanced deliberation, involving questions such as, "Am I influenced by my experience earlier today?" "Would I be leaning toward this treatment had I done otherwise earlier?" Although expert decisions are bound to remain fallible and at the mercy of occasionally irrelevant factors, insight into such factors may contribute to more informed consideration of unappreciated influences in the making of decisions.

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