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Reasoning and relatedness

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ABSTRACT

The purpose of this study was to test for an effect of biological relatedness on reasoning in a Wason card selection task. The behavior of children in a day care was described in a cheater detection rule, an altruism detection rule and a hazard detection rule. Two groups of parents were tested: those who were related and those who were unrelated to the child who was described in the rule. Altruism detection was performed at a lower success rate than cheater detection. As predicted on the basis of inclusive fitness theory, an interaction between problem type (cheater or non-cheater) and relatedness was obtained: an overall superior performance of related parents vanished for the cheater detection problem. Hazard detection was significantly higher for parents related to the child. Parents seem to reason less well about safety rules as they apply to unrelated children compared to rules that apply to their own.

1. Introduction

One of the hallmarks of an evolutionary approach to cognition is that the overarching aim is to identify the mechanisms of behaviors that solve problems of survival and reproduction. Knowledge and cognitive processes are not so much of interest in and of themselves as they are as part of "the seamless whole of behavior" (Barrett, 2008, p. 184). Here, we investigate the cognitions that underlie two sorts of fitness promoting behaviors: punishment of cheaters in social exchanges, without which reciprocal altruism could not have evolved (Cosmides, 1989), and avoidance of physical dangers. In contrast with much previous research that focuses on the thought processes of individuals confronting these sorts of problems, however, we examine those of their close relatives. According to inclusive fitness theory (Hamilton, 1964a, 1964b), fitness benefits to individuals represent fitness benefits to their kin, just as fitness costs to individuals represent fitness costs to their kin. From the point of view of unrelated individuals, however, a benefit to one person does not necessarily represent a benefit to another, and may even represent a cost. Similarly, costs to one person do not necessarily map on to costs to another unrelated individual. In our study, we developed various scenarios regarding the behavior of children in a daycare and examined the reasoning about their actions by close kin: their parents.

The scenarios we developed were all structured as a Wason selection task (Wason & Johnson-Laird, 1972). A conditional rule, "If p then q" is presented, together with four double sided cards. One side of each card shows whether p is true or not, while the other side shows whether q is true or not. The four possible card faces are shown: "p", "not p", "q" and "not q". The participants are asked to turn over just the cards that will allow them to determine whether the rule has been broken. Logic dictates that the "p" and the "not q" cards should be turned over while the other two cards are irrelevant.

Strong content effects have been documented for the Wason card selection task. In particular, when a rule is framed in terms of a social contract such that "If a benefit is accepted, then a cost must be paid", accurate responding amounts to detecting a cheater (i.e. a free-rider): checking for instances of a benefit accepted but cost not paid, which people generally do with little difficulty. A case in point: for a rule such as "If Harry takes a cookie, he must pay a dollar", accuracy (i.e. turning over the "Harry took a cookie" card (p) and the "Harry did not pay" card (not q)) is typically in the range of 65%–80%, whereas rules such as "If a vowel is one side of the card, then an even number is on the other" elicit accuracy in the range of 5%–30%, even if the rules describe familiar content (Cosmides & Tooby, 2013). Rules framed in terms of precautions also elicit comparatively high accuracy (Cheng & Holyoak, 1989; Fiddick, 2004; Fiddick, Cosmides, & Tooby, 2000; Fiddick, Spampinato, & Grafman, 2005), as accurate responding amounts to hazard detection. For instance, people are good at detecting violations of the precaution rule "If you work with toxic gases, then you must wear a gas mask". While others have argued whether performance on these cheater detection and hazard detection tasks reflects the operation of one or more specialized mechanisms (Cosmides & Tooby, 2013; Fiddick et al., 2005; Stone, Cosmides, Tooby, Kroll, & Knight, 2002) or not (Sperber, Cara, & Girotto, 1995; Sperber & Girotto, 2002), for our purposes it is sufficient to note that both tasks involve detection of threats, albeit different threats. Regardless of whether the mechanisms underlying cheater detection or hazard detection are highly domain-specific or more general, perceived costs and/or benefits factor in decision making (Fiddick & Rutherford, 2006).

Both costs and benefits depend on perspective. Cheater detection depends on whether the reasoner adopts the perspective of someone of high or low ranking social status (Cummins, 1999). Detecting

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cheating on employee benefits (i.e. detecting a violation of the rule "If a previous employee gets a pension from a firm, then that person must have worked for the firm for at least ten years") depends on the viewpoint of the reasoner: that of the employee or the employer (Gigerenzer & Hug, 1992). Here, we investigate another perspective: that of a person related or unrelated to the one described in the conditional "If p then q" statement. We used a Wason card selection task for which adult participants were asked to determine whether the rule had been broken by a young child aged 3–6 years. Children as young as this do understand social exchange rules (Harris & Brett, 2001), though the object of our study was not in the children's reasoning but in that of their parents. The name of the child was either the name of the participant's child, or the name of someone else's child.

When a child accepts a benefit without paying a cost, then even though the child is cheating someone else, the kin reap the immediate benefits. We hypothesized that kin (i.e. biological parents) would be less likely to spot the cheater than would be unrelated parents. Note that the task is one of reasoning about cheating, not doing something about it. While parents may or may not tolerate or excuse cheating by their children, our purpose here is to ask whether they detect it.

Performance on a cheater detection problem in this study was compared to that on a problem in which the costs and benefits were reversed: an altruism detection problem. While a cheater is someone who accepts a benefit and does not pay the cost, an altruist is someone who pays a cost without accepting a benefit. Detecting a violation of the rule "If they give blood, then they accept payment" is an altruism detection problem: the rule is broken by someone who pays the cost of giving blood and yet accepts no payment in return. As another example, for the rule "If they volunteer, then they seek credit" (Brown & Moore, 2000), a violation of the rule would consist of volunteering (p) but not seeking credit (not q). We expected a perspective effect in altruism detection in the opposite direction of the effect on cheater detection: while being unrelated to a cheater is more costly than being related, at least in the short term, being related to an altruist is more costly than being unrelated. There should be an added incentive to detect altruism in children by their parents so that they might be in a position to stem the flow of resources. Viewed in this way, having a child altruist is a threat to inclusive fitness. Another view is that having a child altruist is beneficial, as long as the altruism is, eventually, reciprocated. If so, detecting altruism by a child would still be necessary for the parent to be able to reward pro-social behavior and foster inclinations towards reciprocal altruism in the long term. As with the cheater detection problem, our purpose here was to determine whether parents detected altruism by their children, and not to determine the circumstances under which they promoted or curtailed it. We also included a precaution rule, for which we expected that violations would also be more readily detected by related than unrelated parents. The potential cost of a child's violation of a precaution rule would be experienced more acutely by that child's parent than by another child's parent.

2. Methods

2.1. Participants

Participants (N = 48) were mothers (44) and fathers (4), of at least one child aged 3 to 6 years. Two of the parents were adoptive parents, while the rest were biological parents. Adoptive parents were retained because even though they are not biologically related to their offspring, they invest as much or more in them (Gibson, 2009). Their age groups ranged from 21–25 to over 46 years. Parents with their children were recruited for a study on cognition, language and learning in children. When they volunteered or were approached for their participation, they were asked if they would also like to participate in our study on reasoning by parents. Participation took place during the child's appointment for the other study or directly following it. The child was usually in a neighboring room where he or she was visible to the parent on video. Ethics approval was obtained from the Research Ethics Board of our University. Our study typically took 20 min–45 min. Parents were compensated for their time with a $10 gift card from a coffee shop.

2.2. Materials, design and procedure

Each participant was given a paper package that included, in order, an informed consent form, instructions, a practice task, a sealed envelope for each of four Wason card selection tasks and a demographic questionnaire. Four rules of the form "If p then q" were given, and the participants were shown one face of each of four double-sided cards simultaneously. The four faces displayed the statements 'p', 'not p', 'q' and 'not q'. Participants were asked, for each card, whether it was necessary to turn it over to find out if there was a violation of the rule. A correct response to the problem was coded if and only if the participant checked "yes" for two cards and only these two cards: "p" and "not q". If either of those two cards was not checked or was checked "no", or if either of the other two cards ("not p" and "q") was checked "yes", then the response for the problem was coded as incorrect.

Correct responses for the "If p then q" rules corresponded to detection of cheating, detection of altruism, or detection of a hazard (i.e. detection of a violation of a safety rule). The fourth statement was a descriptive rule that mentioned no specific child, related or unrelated. The four statements were as follows: (1) Cheating: "If the child takes a cookie then the child must have earned a gold star sticker" (2) Altruism: "If the child does unpleasant chores in the classroom then the child must have accepted the gum" (3) Hazard: "If the child is to go on the picnic then the child must bring long pants" (4) Descriptive: "If it is the first day of the month then there must be pancakes for lunch". All problems were preceded by a short paragraph outlining the context in a daycare of each rule (Appendix A) and asking the participants to think of themselves as detectives whose job it is to find out if a rule has been broken. The paragraph stressed the importance of only turning over cards that were diagnostic as to whether the rule was broken or not. For instance, for the cheating rule, the cards to turn over were the "X took a cookie" (to see whether that child had paid the price of earning a gold star sticker) and "X did not earn a gold star sticker" (to see whether the child who had taken a cookie to which he or she was not entitled). The other two cards were irrelevant. The statements corresponding to 'p', 'not p', 'q' and 'not q' for the four rules are given in Appendix A.

The key manipulation in this study was relatedness. For each participant, the altruism, cheater and hazard rules included the name of a child. For the related group, the child's name was the name of the parent's own child obtained at the time of the appointment booking, and for the unrelated group, the child was described as being the name of a child unrelated to them. The instructions for the related group stated "Please imagine that the child mentioned in each rule is your own child—the child that you brought with you here today". The instructions for the unrelated group stated: "The child mentioned in each rule is a hypothetical child. Please imagine that this child is an unrelated acquaintance of the child you brought here today. Perhaps they go to the same daycare, or play-group or pre-school. Your own child does not feel strongly about this hypothetical child either way: the hypothetical child is neither a friend, nor an enemy". As parents signed up for appointments, they were assigned to one group or another in alternating order. The name of each child in the related group was assigned another participant as the name for the hypothetical child in the unrelated group. As a manipulation check, following the task, participants were asked of whom they were thinking while completing the task.

All 24 orders of the four problems (cheater, altruism, hazard and descriptive) were used across participants, with the same order being used once for a parent in the unrelated group and once again for a parent in the related group. For each participant, the p, not-p, q and not-q cards appeared equally often in each position (1st, 2nd, 3rd or 4th card) within each of the four series of cards on the four answer sheets.

2.3. Statistical analysis

Analyses were conducted using IBM SPSS statistics 19 software. A logistic model for categorical data was used since it specifies a binomial error (the response to each problem being either correct or incorrect). The tests for the significance of model terms were χ^2 tests.

3. Results

In the Related group, 19 out of 24 participants, or 79%, said that they had been thinking about the child they had brought to the appointment while they were solving the problems or (in just one case) another one of their children. In contrast, only 7 out of 24 participants, or 29%, in the unrelated group said that they were thinking of any of their own children, and so the manipulation was effective ($\chi^2_{(1\ df)} = 10.15$, $P = 0.0014$).

Fig. 1 shows the comparative success rate of participants by problem (cheater, hazard, altruism and descriptive) and group (related or unrelated). The main effect of problem was significant ($\chi^2_{(3\ df)} = 26.64$, $P < 0.0001$). This effect was principally due to the conspicuously poor performance in altruism detection ($\chi^2_{(1\ df)} = 6.34$, $P = 0.012$) compared to the other problems. Examination of the errors made on the altruism detection problem revealed that the "q, not p" error was made by four participants in the Unrelated group and by just one in the Related group. In other words, the data were suggestive of a tendency for the unrelated parents to erroneously choose the "benefit accepted" (took the gum) and "cost not paid" (did not do chores) cards: the very cards that would have been correct in a cheater detection task.

Reasoning about rules involving related children was, on the whole, better than reasoning about unrelated children ($\chi^2_{(1df)} = 4.77$, $P = 0.029$): 51% accuracy for the related group *vs* 37% for the unrelated. The effect of relatedness was particularly pronounced for the hazard detection problem ($\chi^2_{(1df)} = 4.15$, $P = 0.042$), where the detection of hazards for related children was about twice as high as that for unrelated children. The effect of relatedness was significant neither for the altruism problem ($\chi^2_{(1\ df)} = 1.07$, $P = 0.30$) nor for the descriptive problem in which no child, related or unrelated, was mentioned ($\chi^2_{(1\ df)} = 2.10$, $P = 0.15$).

The interaction between problem and relatedness was not significant ($\chi^2_{(3df)} = 5.81$, $P = 0.12$). Nonetheless, Fig. 1 shows no difference between the two groups on the cheater detection problem: the overall weaker performance of the unrelated group seems to disappear when it comes to cheater detection. Indeed, a comparison between cheater-detection *vs* the other non-cheater-detection problems yielded a significant interaction between problem and relatedness: ($\chi^2_{(1df)} = 4.69$, $P = 0.030$).

We considered the possibility that an interaction between problem and relatedness might have been diluted if the parents in the related group had failed to think of their own children, and/ or the parents in the unrelated group had in fact been thinking of their own children. Fig. 2 shows the data set restricted to the 19 of the 24 participants in the related group who reported thinking of their own children and the 17 of the 24 participants in the unrelated group who reported not thinking about them. Here, cheater detection seemed marginally better for the unrelated group, as predicted, while the opposite was true for the hazard detection. Considering just these two problems, the interaction between relatedness and problem was significant ($\chi^2_{(1df)} = 9.92$, $P = 0.002$).

4. Discussion

In this study, every parent in one group was given the same four problems in the same order with the same child's name as another parent in the other group. The only difference was whether the name of the child stated in the problem was the name of the parent's child or the name of someone else's child. Even though the related child, having been brought to the laboratory with the parent, must have been more salient than the imagined unrelated child, relatedness had no discernible effect on reasoning in the cheater problem (Fig. 1), and might even have depressed performance (Fig. 2) as expected. The interaction between relatedness and problem type that we obtained (cheater detection *vs* other) was in line with our predictions, though we had expected a specific cross-over interaction (between relatedness and whether a problem referred to altruism or cheater detection) that was not borne out. One possible reason for cheater detection not having been more depressed than it was in the related group is that, aside from the possible immediate benefits to parents of cheating by their children, there are also future costs that likely come into play: the loss of reputation by their child and consequent social exclusion. Not only are parents sensitive to relatedness in reasoning tasks, children apparently are as well: when asked to imagine committing a social rule violation either against their own mother or a friend, children expressed lessened feelings of guilt if the victim was their mother (Barrett, Keller, Takezawa, & Wichary, 2007).

The logical structure of the altruism detection problem ("if p then q") was no different from that of the others and yet the proportion of correct responses was significantly lower: below 30% for both groups. While we cannot rule out that this effect was due to the particular wording of the problem in each category, our results parallel those of Cosmides (1989), Chang and Wilson (2004) and Fiddick and Erlich (2010) who also found that altruism detection was worse than cheater detection. While others have argued for (Cheng & Holyoak, 1985) or against (Cosmides & Tooby, 2013) the proposition that this sort of rule might be particularly difficult to understand because it does not fit a "schema" of a rule that expresses permission, obligation, entitlement or prohibition, this issue was beyond the scope of this study. No effect of relatedness was detected, possibly because of a floor effect. As with

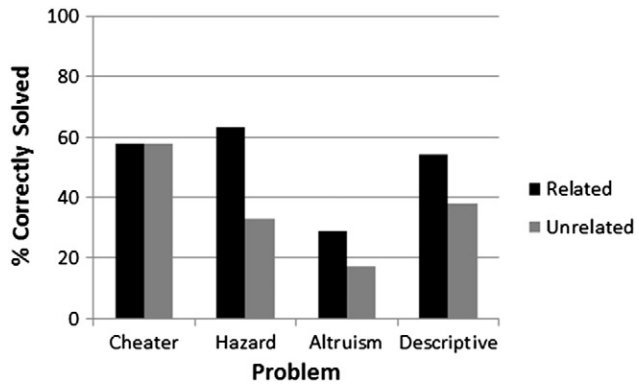

Fig. 1. Frequency of correct solutions by problem and group (related and unrelated). Percentages are based on n = 24 participants in each group who each were given one problem of each type.

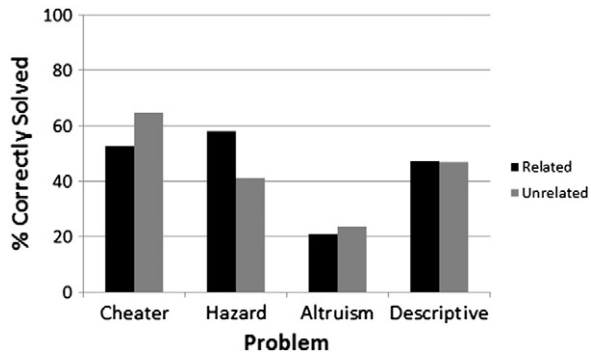

Fig. 2. Frequency of correct solutions by problem and group (related and unrelated) for a restricted data set. Percentages are based on only those 19 participants in the related group who reported thinking of their own child or children during the task and those 17 participants in the unrelated group who reported not doing so.

the cheater detection problem, other future costs and benefits might come into play: while a parent might have heightened sensitivity to the costs of their child's altruism, there is also a potential benefit of enhanced status as a worthy trading partner, especially among other altruists (Brown & Moore, 2000). This benefit, in turn, must be weighed against the possibility of gaining a reputation for being vulnerable to exploitation. Measuring these expected future costs will be a challenge for further research.

Relatedness effects have been documented in other decision making situations (Burnstein, Crandell, & Kitayama, 1994; O'Gorman, Wilson, & Miller, 2005; Wang, Simons, & Bredart, 2001). Here, the strongest effect of relatedness was on reasoning about hazards. In the related group, 15 of the 24 (60%) parents correctly decided that if their own child was going on a picnic where there was a risk of exposure to poison oak, it was important to check whether the child was wearing long pants, and that if the child was not wearing long pants, it was important to check that he or she was not going on the picnic. This accuracy level fell by a half for the unrelated group. Whether this difference in accuracy on a Wason card selection task would translate to a difference in behavior remains to be determined, but it stands to reason that making correct deductions about safety precedes taking effective protective action, in which case our results seem relevant to the literature on parental solicitude. The "Cinderella effect" of mitigation of conflict through biological relatedness has been well documented for assault (Daly & Wilson, 1996, 2005) and homicide (Daly & Wilson, 1988a, 1988b). It has also been manifested in indices of increased risk of accidents. The increase in frequency of failing to wear seatbelts (Case & Paxson, 2001) and the elevated risk of accidental drownings by step-children (Tooley, Karakis, Stokes, & Ozanne-Smith, 2006) undoubtedly result from a diminished investment in the costly behaviors of monitoring and intervening in the activities of children. Our results suggest that this diminished investment may stem from a diminished ability to draw appropriate conclusions regarding safety rules when they apply to non-kin. As parents in reconstituted households consider their new roles and responsibilities towards stepchildren, the issues of material investment (Jorev & Nasanovitz, 2010), allocation of effort and emotional support (Anderson, Kaplan, Lam, & Lancaster, 1999) arise. To this list of issues we would add that while attention should be devoted to the safety of all children, particular care should be devoted to understanding safety rules and their implications when watching over children who are biologically unrelated to the caregiver.

Future research on relatedness and reasoning might profitably address some of the following questions. (1) Key variables in cheater detection include the ability as well as the intention to cheat (Cosmides, Barrett, & Tooby, 2010). Indeed, fMRI evidence shows that neurological structures that are important in theory-of-mind tasks are also active in cheater detection tasks. In contrast, hazard detection tasks differentially activate areas associated with the processing of pain (Fiddick et al., 2005). It may be possible to selectively improve reasoning on cheater detection or hazard detection tasks by priming with specific scenes of cheating or accidents, in much the same way as pathogen detection mechanisms can be activated by exposure to scenes of disease (Park, Schaller, & Crandall, 2007). (2) Our reasoning for this study stemmed from considerations of inclusive fitness. It remains to be seen, however, whether the effects reported here would generalize from parents reasoning about close kin to parents reasoning about unrelated individuals who are socially and emotionally close to them. (3) Other manipulations of relatedness might be attempted. Though we opted not to use photographs of children in this study because our pilot work seemed to indicate that they distracted parents from the reasoning task, they might nonetheless be used to good effect in the future. For instance, photographs of children's faces can be morphed so as to resemble the faces of parents to a greater or lesser extent (Platek, Burch, Panyavin, Wasserman, & Gallup, 2002). (4) The Wason card task used here is a standard reasoning task from the literature on cognition. The instructions (to turn over only the cards that are necessary so as to determine whether a rule is being broken or not) were also standard. Finally, the purpose of turning over the cards was stated as fulfilling the job of a detective so as to catch rule breakers (cheater detection) or protect the children (hazard detection). We can not rule out the possibility, however, that the parents interpreted the instructions in a less purposive way—e.g. "what cards would you like to turn over?" In other words, our results might be better described as "motivated reasoning" (Dawson, Gilovich, & Regan, 2002). The effects reported here may possibly reflect differences in motivation (i.e. a more or less skeptical mindset) or cognition. From an evolutionary perspective, however, it may not matter.

Appendix A. Framing paragraphs for each of the four rules

The child's name in the following rules was either the name of the child brought by the parent (in the related group), or the same name was used as a hypothetical child for another parent (in the unrelated group). Below, the child's name is Virginia.

Cheater

The daycare has implemented a code of conduct: children will be rewarded for pro-social behaviours with a gold star sticker. These pro-social behaviours are costly: e.g. waiting, sharing, putting others first etc. At snack-time, the following rule is applied uniformly:

"If the child takes a cookie then the child must have earned a gold star sticker"

The cookies are hard to resist, and you suspect that children occasionally break this rule, often quite deliberately. Your job as detective is to "catch" the rule breakers.

Here you see one side of each of four two-sided cards, each representing Virginia. One side of the card tells you whether or not the child took a cookie and the other side tells you whether or not that same child earned a gold star sticker.

Questioning children is a little invasive, so you only want to question a child if it is necessary. Please tell us under which circumstances you would question Virginia, by telling us which card or cards you would turn over. For *each* of these cards, please indicate whether you, as a detective, would or would not turn over the card, if you could, to do your job.

[N.B. The four cards corresponding to the p, not p, q and not q statements were: Virginia took a cookie; Virginia did not take a cookie; Virginia earned a gold sticker; Virginia did not earn a good sticker.]

Hazard

The daycare is planning an outing for children who wish to participate: the children have the opportunity to go to a lake and have a picnic, and those that do not go on the picnic will have a special games day at the daycare. Unfortunately, there is some poison oak (like poison ivy, it causes bad skin irritation) around the lake but the day care workers will ensure that the children stay clear of those areas. As an additional safety measure, the day care has established the following rule to minimize the risk of exposure of skin contact with poison oak:

"If the child is to go on the picnic then the child must bring long pants"

On the day of the outing, as attendance is called, the principal of the daycare wishes to ensure that this rule is not being broken, so as to protect the children and also to avoid liability—and so she has hired you, the detective. The children have all arrived with notes from their parents expressing a wish for the child to go on the picnic or not.

Here you see one side of each of four two-sided cards, each representing Virginia. One side of the card tells you whether or not

the child has a parental request for the picnic and the other side tells you whether the same child has brought long pants or not.

Questioning the children is slightly upsetting to everyone, so you only want to question a child if it is necessary. Please tell us under which circumstances you would question Virginia, by telling us which card or cards you would turn over. For *each* of these cards, please indicate whether you, as a detective, would or would not turn over the card, if you could, to do your job.

[N.B. The four cards corresponding to the p, not p, q and not q statements were: Virginia has a request to go on the picnic; Virginia has a request to stay at the daycare for games; Virginia has brought long pants; Virginia has not brought long pants.]

Altruism

There are some unpleasant chores to do in the daycare at the end of the day, and not a single one of the children likes to do them. These chores benefit everyone: sweeping crumbs off the tables, stacking chairs, picking up wet mittens from the floor, wiping up spills. Not only are these chores unpleasant, but they even cost their parents a little time at the end of the day as they wait. Nonetheless, some of the children occasionally volunteer to do these chores. The director would like to identify those who are demonstrably working purely from the goodness of their hearts. This is important to the director because she would like to trust one of them to dispense gifts fairly and generously on the last day before the winter break. But of course, there is another possible explanation for why children might be volunteering to do the chores, which is that when the teacher thanks the volunteers, she also offers them a frequently used treat at the daycare: two sticks of sugarless gum. So it is possible that the volunteers expect and accept the gum, and their behaviour fits the following rule:

"If the child does unpleasant chores in the classroom then the child must have accepted the gum"

The director has given you the job, as detective, to find out when the rule is being broken. This will help the director to determine who should be a candidate for being entrusted with her gift-distribution task.

Here you see one side of each of four two-sided cards, each representing Virginia. One side of the card tells you whether the child has done the unpleasant chores in the classroom and the other side tells you whether that same child accepted the offer of the sticks of sugarless gum.

You have many other things to do besides finding out what children did and did not do on any day, so you only want to ask questions about a child if it is necessary. Please tell us under which circumstances you would ask questions about Virginia's behaviour, by telling us which card or cards you would turn over. For *each* of these cards, please indicate whether you, as a detective, would or would not turn over the card, if you could, to do your job.

[N.B. The four cards corresponding to the p, not p, q and not q statements were: Virginia did the unpleasant chores; Virginia did not do any of the unpleasant chores; Virginia accepted gum; Virginia did not accept any gum.]

Descriptive

At the daycare everyone loves pancakes. The children especially hate to miss any day when there might be pancakes. Unfortunately the cook is a little disorganized and never knows ahead of time what she will be making for lunch: sometimes there are long stretches without pancakes, and sometimes there are pancakes day after day. She refuses to make a monthly plan of what (whether it be pancakes or not) will be served each day, but she has at least promised to try to follow the following rule, which has been announced to the parents and children:

"If it is the first day of the month then there must be pancakes for lunch"

Even so, the cook is known to be so forgetful that the rule may well be broken occasionally. Your job as detective is to find out when the rule is being broken so that at the next staff meeting the pancake issue can be revisited.

Here you see one side of each of four two-sided cards, each representing a drop-in visit to the daycare. One side of the card tells you what day it is, and the other side tells you whether pancakes are on the menu for lunch or not.

Double-checking the date and/or asking for the menu is time-consuming, so you only want to do the research if it is necessary. Please tell us under which circumstances you would bother to find out anything more, by telling us which card or cards you would turn over. For *each* of these cards, please indicate whether you, as a detective, would or would not turn over the card, if you could, to do your job.

[N.B. The four cards corresponding to the p, not p, q and not q statements were: Today is February 1st; today is March 19th; there are pancakes for lunch today; there are no pancakes for lunch today.]

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