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A Validation and Exploration of the Collins-Michalski Theory of Plausible Reasoning

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Abstract

Collins & Michalski (1989) developed a descriptive theory of plausible reasoning that provides a formal framework, a language, and a computational model for describing human plausible reasoning. The current research was designed to validate the structural aspects of the theory and to examine the impact of world knowledge on the inference process. People were asked to make inferences about one of two domains: one where the subjects may have had prior knowledge that could be brought to bear on the inference process, and one where they could not have such knowledge. The inferences generated were analyzed within the framework of the model. The results demonstrated that the structural aspects of the original Collins & Michalski model were adequate to account for the reasoning patterns observed in the protocols that are within the scope of the theory. Further, the results suggest that people rely more heavily on their personal background knowledge when they have a choice.

A Validation and Exploration of Structured Aspects of the Collins-Michalski Theory of Plausible Reasoning

Introduction

Unlike in formal logic, premises for reasoning in real-life situations are typically incomplete, uncertain, imprecise or indirectly relevant. Yet, humans have a remarkable ability to reason and derive useful conclusions from such imperfect premises. For example, people can find a desired place in a newly visited city from a combination of sketchy directions from a passer-by, imprecise information in a map, and general knowledge of the city. They are able to integrate various bits and pieces of information from different sources, resolve contradictions if they occur, and derive the most likely conclusion.

Collins and Michalski (1989) developed a core theory of plausible reasoning that provides a formal framework, a language and a computational model for describing human plausible reasoning processes. It is a descriptive theory that tries to characterize observable aspects of human reasoning, in contrast to normative theories, which treat reasoning as a formal mathematical theory (e.g., Smets et al., 1989). The normative theories are strongly anchored in formal logic, and include probabilistic reasoning (Pearl, 1988; Nilsson, 1986), non-monotonic reasoning (McCarthy, 1980), default reasoning (Reiter, 1980), fuzzy logic (Zadeh, 1965), and multiple-valued logic (Lukasiewicz, 1967). The primary objective of these theories is to investigate parametric aspects of reasoning, i.e., to develop methods for determining the certainty of conclusions on the basis of the certainty of the premises, without investigating the meaning of the premises. In contrast, the proposed theory attempts to investigate semantic aspects of reasoning, and combine them with parametric aspects. For example, the proposed theory allows for the construction of new information in the process of generating an inference. It also allow for the use of this information in later stages of generating an inference and for the expression of degrees of certainty in a response. The latter are captured by a collection of different parameters that have influence on the certainty of reasoning, such as typicality, frequency, dominance,

dependency, etc. The theory includes a variety of inference patterns that do not occur in formal logic-based theories. However, the initial theory was limited to core aspects of reasoning, that is, aspects of general reasoning, and it did not specifically address temporal or spatial properties and relationships.

The present research had two primary objectives. First, it attempted to validate the structural aspects of the theory, and to determine what enhancements or extensions might be needed to account for the data. Second, it examined the impact of prior factual (background) knowledge on the inference process. The Collins-Michalski theory was initially developed by analyzing the inferences that people made about a domain where they had no special background knowledge (e.g., reasoning about weather patterns in a geographical domain; Collins and Michalski, 1989). In the current study, we developed two situations, one in which people were asked to make inferences about a domain where they may have had some special background knowledge that could be brought to bear on the inference process, and one in which they could not.

An Overview of the Theory

Collins & Michalski (1989) offer a framework for characterizing recurrent patterns in human reasoning. These patterns have been captured in a model that contains a set of primitives, operators, and basic inference rules that are applied to knowledge residing in a hierarchical representation system. The primitives enable the specification of knowledge components. The operators allow specification of transformations that can be applied to the basic components in the process of plausible inference.

Insert Figure 1 about here

Primitives

Primitives include arguments, descriptors, terms, and referents, which are represented as nodes of a *type* (is-a) hierarchy or *part* hierarchy (Figure 1). The hierarchies are dynamic, in the sense that they grow and change with experience. Arguments and referents stand for entities

(objects, processes, ideas, etc.) in a statement. The same entity may serve as an argument in one statement and as a referent in another. Descriptors are attributes, functions or relations that are used to describe entities. A term is defined as a descriptor applied to one or more arguments; a referent is a specific value of a term taken from a set of legal values.

Insert Figure 2 about here

For example, Figure 2 presents examples of arguments, descriptors, terms and referents. Descriptors can be attributes, such as color, functions such as distance, and relations, such as greater than or between.

Terms are formed by applying descriptors to one or more arguments. Thus, for example, the descriptor color applied to the argument carnation forms the term "color(carnation)". Terms have a special significance, because many reasoning tasks can be viewed as evaluating terms. Evaluation of a term may take place by following the trace connecting the descriptor and the argument(s), by instantiating a general rule (mutual implication or term dependency), or by one or more plausible statement transforms, such as those described below.

Referents are the result of an evaluation of a term, where a descriptor is applied to an argument. Thus, the referent formed from the term "color(carnation)" is "red".

An argument can be any node of a hierarchy, a referent can be any node except for the root node, and a descriptor can be any node except for the leaf node. Arguments, descriptors, and referents are used in the construction of simple statements, term dependencies and mutual implications. Simple statements are used to represent facts and properties of the objects in the knowledge-base. Mutual implications and term dependencies constitute more complex knowledge, which play the basic role in generating plausible inferences. Examples of each of these can be seen in Figure 3.

Insert Figure 3 about here

Simple statements, term dependencies, and mutual implications are represented as traces linking nodes in different hierarchies. The traces are annotated by a set of parameters (denoted below by π) influencing the strength of the belief in the reasoning process. The parameters represent the frequency of usage, reliability of the source of information, dominance and typicality of a subset within a set, the consistency of the trace with other parts of the knowledge base, the strength of forward and backward implication or term dependency, etc. (Collins and Michalski, 1989).

One of the major assumptions of the theory is that plausible inferences correspond to "small perturbations" of the traces. For example, Figure 1 shows a trace representing the statement "The vertebrates of UK include fish and birds". This can be used as a base statement for generating inferences "The vertebrates of *Europe* include fish and birds" (a deductive generalization), or that "The vertebrates of *Sussex* (a part of UK) include fish and birds" (an inductive specialization).

Operators and Basic Inference Rules

The theory defines eight basic operators (transforms) on a simple statement. These transforms are viewed as forms of plausible inference. A transform is done by "perturbing" the argument or referent in a trace spanning one or more hierarchies. As mentioned above, the plausibility of the resulting statement is dependent on the type of perturbation. It also depends on the parameters associated with the base statement. The transforms are classified into two groups. In the first group, transforms modify the argument, whereas in the second group, they modify the referents. The modification is done by generalizing, specializing, similizing, or dissimilizing. These modifications are always computed in some context (CX) which is denoted by the CX variables below. The context variables specify the set of descriptors to be used in moving

through the hierarchy. For example, one could generalize the argument "felines" in the context of mammals and their physical features or in the context of a particular feature, such as neck length. For simplicity, the certainty parameters are omitted in the following examples. To describe the transforms, we use the following notation.

Generalization of a node "a" in a hierarchy to another node "a' " in context "CX" is denoted

a' GEN a in CX(d(a'))

where d(a') denotes descriptors relevant to a' in the given context. For example, a mammal is a generalization (GEN) of felines in the context (CX) of mammals and their physical features.

Specialization of a node "a" in a hierarchy to another node "a'" in the context "CX" is denoted

a' SPEC a in CX(d(a'))

For example, a cat is a specialization (SPEC) of felines in the context (CX) of felines and their general properties.

The fact that a node "a" in a hierarchy is similar to another node "a' " in the context "CX" is denoted

a' SIM a in CX(d(a'))

For example, tigers are similar (SIM) to cats in the context (CX) of physical features of felines.

The fact that a node "a" in a hierarchy is dissimilar from another node "a' " in the context "CX" is denoted

a' DIS a in CX(d(a'))

For example, tigers are dissimilar (DIS) from cats in CX of size of felines.

Before we formally describe the eight transforms, Figure 4 gives an example of each transform as applied to the base statement: "The flowers of England include daffodils and roses." A simple statement can be a seed for four different type of inferences: generalizing, specializing, similizing and dissimilizing transforms. Each type can be applied either to an argument or a referent, thus we have a total of eight transforms.

Insert Figure 4 about here

Generalizing Argument (GEN A). The generalizing argument extends the applicability of a descriptor-referent pair from an argument to its ancestor. The confidence in the generalized statement is less than in the base statement (Michalski and Zemankova, 1989). The validity of the transform essentially depends on the predictability of the descriptor value from a general node to a specific node, the typicality of the more specialized argument within the more generalized node, and the multiplicity of arguments. The predictability of the descriptor value is proportional to the uniformity of the referent among specialized nodes. In the examples given below, formal ways of using and combining various parameters are not addressed.

Figure 5 provides the general form and specific examples of the four basic transforms. In the example for the generalizing argument, the base statement says that "*the performance of Unisys in 1988 was good.*" *Unisys* is represented in the hierarchy of companies and the node corresponding to *computer_companies* is its ancestor. The typicality of *Unisys* within *computer_companies* is high. There is also a term dependency which states that *business_type* of a company is relevant to the *performance* of a company. Using all this information, we can generalize the base statements to infer that it is likely that "*the performance of computer_companies in 1988 was good.*"

Insert Figure 5 about here

Specializing Argument (SPEC A). In contrast to the generalizing argument transform, the specializing argument transform restricts the scope of a descriptor-value. If the descriptor-value were to be inherited from a generalized node to the specialized node without exceptions, the inference would be deductive and certain. The statement "*mammals have four legs*" would imply that the *kitty cat* (who is a mammal) *has four legs*. The formalization of the specialization

transform goes beyond a mere deductive inference and attempts to look for exceptions by validating the inference after ascertaining that the inheritance of the descriptor value is justified.

For example, in the process of assigning "*four legs*" to a whale, the reasoning process would look at the context of "*habitat*", which has a close functional connection to legs (by means of locomotion). It would see that a whale is not a typical mammal with respect to habitat, and therefore the conclusion that "*a whale* (which is a mammal) *has four legs* " would be blocked. A similar analysis would hold for a *bat* which is a mammal, but is atypical with respect to the means of locomotion and habitat among mammals. Notice that such relations between two or more descriptors can be used in multiple ways.

For example, it can be easily deduced that "*a tiger* , which is a mammal, *has four legs*." However we cannot infer that "*a tiger has claws,*" since the rule that "*mammals have claws*" is too weak. However, such an inference can be strengthened by noting that "a *tiger is a hunting animal.*" Since there is a close functional relationship between claws and hunting activity, one might deduce that "*a tiger has claws.*" Note that the same line of reasoning would allow an inference that "*an eagle*, which is a bird of prey, *has claws*," on the same grounds of functional association, though *eagle* and *tiger* are otherwise far removed in the type hierarchy of animals than *tiger* and *cow*.

The strength of the inference depends on the background knowledge as to the alternative means of hunting. There is a need to combine not just one, but several lines of reasoning, as is clear from a parallel example that "the *tigers have sharp teeth*" but "the *eagles have no teeth at all!!*" The further one is away from the base statements, the more one has to look for alternative explanations and new evidence.

In the example shown in Figure 5, we have a base statement that "*the major religion in South American countries is Roman_Catholicism.*" *Brazil* appears as a lower level node (descendant) of *South America* in the part hierarchy of places. There is a term dependency stating that *religion* of a country is related to the *geographical location* of the country (countries in the same geographical proximity tend to have similar religious background). From this it can be concluded that "*the major religion in Brazil is Roman_Catholicism.*"

Similizing Argument (SIM A). The similizing argument is a statement transform which depends on the similarity between two arguments rather than an ancestor-descendant relation between them. Because all the nodes in the hierarchy potentially can be used as similar nodes, all the nodes in the hierarchy would need to be examined in order to find the best match. This makes the transform a computationally unattractive means of answering queries unless a good similar argument is known beforehand. This transform is therefore valuable in verifying inferences from other lines of reasoning.

The example shown in Figure 5 uses the similarity between arguments to deduce that "*the economic_state of Hong_Kong is strong.*" The inference is based on the information that "*the economic_state of Singapore is excellent*", that *Hong_Kong* is very similar to *Singapore* in the feature space of economy_type, tax, resources, communication, and that the feature space is relevant to the economic_state of a country.

Dissimilizing Argument (DIS-A). The dissimilizing argument transform depends on the dissimilarity between two arguments. The transform depends on the assumption that if some context is relevant to the descriptor, then two arguments which are dissimilar in the context will likely have a different descriptor-value (referent). This transform can be used to eliminate one or more contending hypotheses. It can also be used to increase the certainty of a conclusion by showing that alternative hypotheses are not plausible.

The example in Figure 5 uses the dissimilarity between arguments to deduce that "*a cow is not a carnivorous animal*". The inference is based on the premises that *cow* and *tiger* differ with regard to having or not having *sharp teeth* and *claws*, and that these properties are important for carnivorous animals.

Method

Subjects

The subjects were eight individuals solicited from within the George Mason University community.

Materials

A table composed of 13 countries and their general characteristics was designed for use in this study. The characteristics were values of descriptors (attributes) that were selected as relevant for generally describing these countries. The descriptors included the type of government, type of press, the literacy rate, the type of work force, major religions, trading partners, major industry, per capita income, and the relations with the United States. Their values were determined from published literature. Eighteen of the country attribute values were replaced with question marks. These attribute values were the characteristics that the subjects were asked to infer in the experiment. A second version of the table was created in which the country names were replaced with three letter nonsense names (e.g., ABC, DEF). Subjects who received this table were not told that the rows in the table represented actual countries. The table (shown with both sets of labels) can be seen in Figure 6.

Insert Figure 6 about here

Design

The design of the study was a two-factor mixed design. The between-subjects factor manipulated whether the subjects were given the actual names of the countries used in the matrix or the nonsense names. Questions (represented by the 18 cells within the table which were left blank) was the within-subjects variable.

Procedure

The participants were provided with a copy of one of the two versions of the table (four participants received a table with the actual country names, the other four received a table with the nonsense names). Before collecting the protocols, the nature of the table was explained to the participants; they were also briefly told the purpose of the experiment. They were then asked to generate plausible entries for each of the cells which contained a question mark. Thus, they were asked to make a plausible inference for each of 18 cells in the table. No specific time limit was set to answer the questions. The subjects typically took about an hour to answer the 18 questions.

They were asked to verbalize their thought processes and the reasons for their conclusions as they completed their task. The verbal protocols were recorded and transcribed for analysis.

Results

Validation of the Theory

The first objective of this research was to validate the structural aspects of the theory and to determine if any modifications or extensions appeared necessary in order to characterize the observed inferences. Validation, as used here, refers to the ability of the constructs currently in the model to easily capture the information expressed in the verbal protocols. The original theory was developed to explain the cognitive processes occuring when making inferences at a level of abstraction close to that of natural language, but with a more formal and specific constructs. These constructs were designed to capture important components of the inference process.

To examine the validity of the rules currently in the model, the 144 protocols (eight participants answering each of 18 questions) were analyzed to determine the inference rules being used. For example, Figure 7 provides the protocol from one participant's response and illustrates the analysis for that protocol. In the example, LR means line of reasoning, RS means a reasoning step, PBK means personal background knowledge, GBK indicates given background knowledge (i.e. given in the table), MI indicates inference from mutual implication, M Recall means memory recall (i.e., that the info was drawn directly from personal knowledge presumed stored in memory), and the number of statements based on earlier reasoning (RS#).

Insert Figure 7 about here

The number of times each basic inference rule was used was tabulated, and can be seen in Figure 8, categorized by whether or not the participant knew the actual country names. In addition, counts were made of the inferences based solely on the information contained in the table (GBK), the number of inferences based on personal background knowledge (PBK), and the number of statements made directly as a recall from memory (M-Recall).

Insert Figure 8 about here

The set of protocols generally emphasized simple reasoning patterns involving reasoning by the application of one or more mutual implications. The protocols also relied heavily on the use of personal rules. In many cases, these rules reflected what might be called "facts"; that is, the rules were ones that most people would argue are true. For example, in response to the question "What is the type of government in DEF (Angola)?", one subject stated *"press is state--communist government"*, stating that a state-controlled press generally indicates a communist government.

In other cases, however, the personal rules appear to have no factual basis. For example, in response to the same question cited above, another subject responded "Angola, I would say that it is communist. I hear about it in the news so much." In this case, there seems to be little objective basis for the rule being invoked, that is, that being on news implies that a country has a communist government.

Another feature of the protocols was the use of different lines of reasoning. Subjects often came to a conclusion using a particular piece of information and then continued by using other information to confirm the original conclusion. For example, Figure 9 provides the protocol generated by one subject in response to the question "What is the relationship between Vietnam and the USA?". In this response, the subject first reasoned that communist governments typically have strained relations with the United States. The subject then goes on to provide other reasons (such as PR problems and lack of cooperation in releasing POWs), confirming the lack of relationship with the United States.

Insert Figures 9 and 10 about here

In some cases, the pursuit of another line of reasoning led to a modification of the original conclusion. This can be seen in another subject's response to the same question (shown in Figure 10). In this response, the lines of reasoning lead to different conclusions about Vietnam's relationship with the United States. The final conclusion reflects a compromise between the various conclusions reached. In other cases, the resolution of conflicting conclusions was only reached by adhering to one of the original conclusions, but with a lower degree of certainty. This can be seen in the response to the question, "What is the type of government in DEF?" shown in Figure 11. In this response, the subject first concludes that the government is not communist because it trades with the United States. However, the conclusion that the government is not free is subsequently drawn based on the fact that the type of press in DEF is state. This eventually leads the subject to conclude, *"I'm not positive that it is communistic, but I don't know the types of government"*.

Insert Figure 11 about here

This feature of the protocols further suggests a meta-rule: If Conclusions (RSi), i = 1,...,n coincide, then the Conclusion (RSi) is accepted. Otherwise, the answer is uncertain.

It may be noted that in many of these examples, the reasoning is fairly independent of the information provided to the subjects in the table. Reasoning patterns involving constructive processes based on the tabled information, such as the discovery of dependencies or checking for consistency of personal knowledge with that available in the table, were far less frequent. However, some examples of each were found. In response to the question "What are the major religions in GHI (Brazil)?", one subject responded:

"God, I am surprised so many are Roman Catholic, Um, sounds good for that one too, but I don't really know. Is there a connection? I'd go with Roman Catholic for GHI, because it seems there is a kind of pattern for Roman Catholics. Cause there's for GHI

& VWX they are basically the same forces, and almost the same industries. Trading partners are about the same. Same with YZA so that is why I picked Roman Catholic".

The first sentences of this protocol suggest that this subject did note consistencies in the table and made a generalization from it. The latter part of the protocol suggests that the subject also noted the similarities among the countries in the table and confirmed the earlier generalization based on a similarity transform.

Another use of the information in the table can be seen in the response of one subject to the question, "What are the major religions in JKL?":

Subject: "The government is parliamentary democracy, it is probably like England or something but I don't know what are the major religions there. I'd say something like Roman Catholic or Protestant, I'll just say Protestant, oh, Anglican, that is what it is."

Interviewer: "Why Anglican?"

Subject: "Because that's the major religion in England. That's what I think that is. Oh, industry, steel, probably not. I don't know enough about exports, I never did well in this class. Now I am going to take a world geography course just so I can do well on this thing. I said Roman Catholic, just because Roman Catholic is highest in terms of numbers in religion besides eastern as far as free countries (are concerned)."

In this protocol, the subject initially concludes that the country's religion is Anglican based on the hypothesis that the country's identity is England. However, the subject then disconfirms the hypothesis by noting that steel is given as a major industry in the table.

There were also a few patterns in the protocols that could not be captured easily by the existing theory. For example, in response to the question "What is the major industry in Iran?", one subject produced the following response:

"Iran. Major industries. You know, I have no idea. When we stopped, when we closed the diplomatic relations with Iran uh, in when were the hostages taken? 81? 80? Um, our press was naturally very limited. What appears in our press, if at all, photographs from Iran are from foreign press. We know so very little, and what we see is always these, they're just crazy, these crazy Moslems. Let me put it this way, we only see or

hear about radical fundamentalists. Um, again, I imagine Iran has been historically an agricultural based society. Uh, however, to finance his revolution and got to imagine his, Khomeini's, war with Iraq, he's been forced to industrialize to a point. Now that the war has ended with Iraq they'll probably be able to convert those weapons, those material factories into more consumer goods."

This protocol contains temporal information, a structural component not explicitly contained in the current theory. However, every predicate relating to a real object or situation (e.g., Govt_type(Cntry)) has an implied temporal argument that may be used when it is needed (e.g., Govt_type(Cntry,now) or Govt_type(Cntry,past)).

A second pattern seen frequently in these protocols and not contained in the current model is exemplified by the answer to the question, "What is the type of government in VWX?" shown in Figure 12. Here, the subject appears to be making an inference based on the pattern of the attributes assigned to the country. To handle cases such as these, we have suggested a new rule, which is shown in the analysis of the answer in Figure 12. Here, a "Country_type" is defined by a set of properties. A characteristic of that country_type (here, type of government) can then be defined as resulting from that pattern of attributes. Finally, the particular country is seen as a specific instance of that country_type and hence inherits the value of the attribute associated with that country_type.

Insert Figure 12 about here

A third pattern not contained in the current model is needed to capture one subject's response to the question, "What is the literacy rate in MNO?".

"Type of government is communist, the type of press is state, industry and service produce textile that suggests sort of a blue collar workforce. Probably the literacy rate is low because those type of countries like to keep their people oppressed. Also the income is low which suggests little education so they'd have higher learning power."

In order to capture this protocol formally, a rule is needed which says that if an agent wants to achieve a given result (R), and if the agent knows that doing something(X) helps R, then the agent will do X.

Impact of World Knowledge on the Inference Process

The second objective of this study was to examine the impact of world knowledge on the plausible inference process. Specifically, we were interested in determining whether a participant's knowledge of the domain would change the inference process. The data suggest that domain knowledge does change the process. This can be seen both in subjective and objective analyses of the protocols. Participants aware of the country names tended to state their conclusions first, often as a direct memory recall, followed by one or more lines of reasoning designed to confirm the original statement. For example, the response to the question "What are the major religions in Canada?" (seen in Figure 7) shows that the subject starts with a recall of information in the form of a statement and then goes on to offer supporting documentation. A similar pattern can be seen in Figure 13, which shows a protocol produced in response to the question "What is the type of work force in Vietnam?".

This pattern contrasts sharply with that shown by subjects who were not informed of the actual country names. Figures 14 and 15 show the responses to the same questions discussed above for subjects who were not aware of the actual country name. In these protocols, there is much more reliance on the information presented in the table.

Insert Figures 13, 14 and 15 about here

These results can be clearly seen in the more objective data (summarized in Figure 8). It was clear that, overall, participants who were informed of the actual country names relied much less heavily on inferences drawn from the material presented and much more heavily on information retrieved from Personal Background Knowledge (PBK). Chi squared analyses showed that the

number of inferences based on information given in the table (GBK) was much lower when participants were aware of the actual country names ($\chi^2(1) = 67.6$, $p < .01$); on the other hand, the number of statements drawn directly from memory was much greater ($\chi^2(1) = 47$, $p < .01$). The number of personal rules used to support the conclusions was the same for the two groups of participants ($\chi^2(1) = 0.07$, $p > .05$). While no formal analyses of the data were carried out due to the small number of responses in each category, an examination of Figure 8 also suggests that the use of particular statement transforms follows a similar pattern for both groups of participants.

Discussion

The results of this study suggest that the structural aspects of the theory developed by Collins & Michalski were adequate to account for most of the reasoning patterns observed in the protocols. These protocols suggest that people always attempt to build a consistent, plausible scenario to explain their conclusions based on beliefs and personal background knowledge (PBK). In developing this scenario, people follow several lines of reasoning and the individual lines are weighted and compared. If different lines lead to different conclusions with a similar weight, a subject does not express any opinion (i.e. "I do not know") or they accept their original conclusion, but with a lower degree of certainty (e.g., "I'm not sure, but ...").

Further, the protocols suggest that people rely heavily on their personal background knowledge in developing plausible inferences. Subjects in both groups relied heavily on personal rules, even when objective standards would suggest that these rules were invalid.

The results also suggest that when people have preexisting knowledge about a domain, they will rely more heavily on that data, even to the point of ignoring newly presented information. Finally, the data support the theory's contention that hierarchies, term dependencies and mutual implications are very important components of the process of plausible reasoning. In the present study, the question of how people learn these components was not addressed. Further research needs to be done to find a computational model of how people create conceptual hierarchies, and discover implications and dependencies. The theory also needs to be related to existing methodologies, and extended to include temporal reasoning, spatial reasoning, reasoning under

time and resource constraints (e.g., related to the variable precision logic, as described by Winston and Michalski, 1986), as well as meta-knowledge reasoning.

In conclusion, the experiments have demonstrated that the theory provides an adequate mechanism for representing reasoning for the class of tasks investigated. The theory offers new tools for knowledge representation, and has a potential for applications in a variety of fields, such as decision making and analysis, diagnosis (medical, agricultural or technical), goal recognition, intelligent tutoring, object and scene recognition, planning, autonomous robotics, estimating costs and labor in design, document retrieval systems, etc.

Authors Notes

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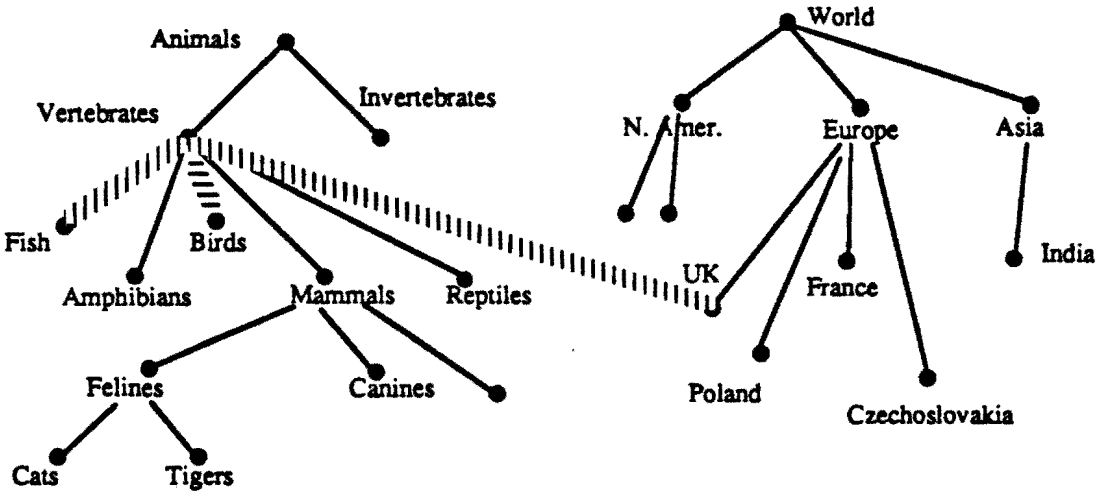

Type hierarchy **Part hierarchy**

Figure 1: Example Hierarchies and a Trace

Primitive	General Notation	Type of Primitive	Example	Specific Notation
Argument	a_i	-	carnation	a_1
		-	GMU	a_2
		-	Cornell	a_3
		-	population(VA)	a_4
		-	population(DC)	a_5
Descriptor	d_i	attrributes	color	d_1
		functions	distance	d_2
		relations	greater than	d_3
Terms	$d_j(a_i, a_{i+1}...)$	-	color(carnation)	$d_1(a_1)$
		-	distance(GMU, Cornell)	$d_2(a_2, a_3)$
		-	greater-than(pop(VA), pop(DC))	$d_3(a_4, a_5)$
Referents	r_i	-	red	$r_1 = d_1(a_1)$
		-	400-miles	$r_2 = d_2(a_2, a_3)$
		-	true	$r_3 = d_3(a_4, a_5)$

Figure 2

Simple Statements (SS):

$$d(a_1) = r_1 : \pi$$

Examples:

Density(aluminum) = 2.7: π
Age(John) = 55: π
Likes(Robert, Mary) = very_much: π

Term Dependency

$$d_1(a_1) \text{ <---> } d_2(a_1) : \pi$$

Example: Assets(firm) <---> Credit_rating(firm): π

Mutual Implications (MI):

$$SS_i \text{ <==> } SS_j : \pi$$

Example: Latitude(place) = north <==> Temp(place) = cold: π

Figure 3: Examples of Simple Statements, Term Dependencies and Mutual Implications

BASE STATEMENT:		Flower-type(England)	= {daffodils, roses, ..}
GEN-A	(*Generalizing Argument*)	Flower-type(Europe)	= {daffodils, roses,..}
SPEC-A	(*Specializing Argument*)	Flower-type(Surrey)	= {daffodils, roses,..}
SIM-A	(*Similizing Argument*)	Flower-type(Holland)	= {daffodils, roses,..}
DIS-A	(*Dissimilizing Argument*)	Flower-type(Brazil)	≠ {daffodils, roses,..}
GEN-R	(*Generalizing Referent*)	Flower-type(England)	= {temperate flowers}
SPEC-R	(*Specializing Referent*)	Flower-type(England)	= {yellow roses}
SIM-R	(*Similizing Referent*)	Flower-type(England)	= {peonies, ..}
DIS-R	(*Dissimilizing Referent*)	Flower-type(England)	≠ {bougainvillea, ..}

Figure 4: Examples of Statement Transforms

ARGUMENT TRANSFORM	GENERAL FORM	EXAMPLE
Generalizing	Descriptor(Argument$_1$) = Referent Argument$_2$ GEN Argument$_1$ in CTX Descriptor <--> CTX --- Descriptor(Argument$_2$) = Referent	Performance (Unisys, 1988) = good Computer_companies GEN Unisys in CTX(Business_type) Performance <--> Business_type: --- Performance(Computer_companies, 1988) = good
Specializing	Descriptor(Argument$_1$) = Referent Argument$_2$ SPEC Argument$_1$ in CTX Descriptor <--> CTX --- Descriptor(Argument$_2$) = Referent	Major_religion(So_Amer_Cntries) = {Roman_Catholic, ..} Brazil SPEC So_Amer_Cntries in CTX(Geo_location) Major_religion <--> Geo_location --- Major_religion(Brazil) = {Roman_Catholic,..}
Similizing	Descriptor(Argument$_1$) = Referent Argument$_2$ SIM Argument$_1$ in CTX Descriptor <--> CTX --- Descriptor(Argument$_2$) = Referent	Economic_state(Singapore) = Excellent Hong Kong SIM Singapore in CTX(Economy_type, Tax, Latitude, Resources, Communication, ..) Economic_state <--> CTX --- Economic_state(Hong Kong) = Excellent
Dissimilizing	Descriptor(Argument$_1$) = Referent Argument$_2$ DIS Argument$_1$ in CTX Descriptor <--> CTX --- Descriptor(Argument$_2$) ≠ Referent	Carnivorous(Tiger) = yes Tiger DIS Cow in CTX(sharp_teeth, claws, ..) Carnivorous<--> CTX --- Carnivorous(Cow) ≠ yes

Figure 5

Country	Govt. Type	Press	Literacy Rate	Work Force	Major Religions	Trading Partners	Major Industry	P Capita Income	Relations with US
Afghanistan ABC	communist	?4	very low	agric rural	Sunni Moslem Shiite Moslem	? 11	textiles	v. low	hostile
Angola DEF	?1	state	med low	agric	R. Catholic	USA	cotton goods fishmeal,alcoho	?15	strained
Brazil GHI	democratic republic	private	med high	services agric industry	?9	USA Japan Neth Ind	steel, autos chemicals	low	?16
Canada JKL	parliament democracy	private	very high	industry services	?10	USA	steel	high	normal
Cuba MNO	communist	state	?6	industry services	R. Catholic none	? 12	textiles wood products	low	hostile
Egypt PQR	democratic republic	mixed	medium	agric sevices	Sunni Moslem	USA, W.Germ Israel	?13	v. low	normal
Iran STU	theocracy	state	medium	agric industry	Shiite Moslem	W.Ger Japan, Italy	?14	low	hostile
Italy VWX	?2	mixed	high	services industry agric	R. Catholic	W.Germ. France USA	steel, autos shoes	medium	normal
Mexico YZA		private	med high	services agric manufac	R. Catholic	USA Japan Spain	steel chemicals	med low	normal
Peru BCD	?3	?5	med high	services agric industry	R. Catholic	USA W.Germ Japan	fishmeal steel	low	normal
Poland EFG	communist	mixed	very high	?7	R. Catholic	USSR Czech E&W Ger	shipbuilding	low	?17
Vietnam HIJ	communist	state	med high	?8	Buddhist Confucian Christian animist	USSR Japan H.Kong	food processing textiles	v. low	?18

Figure 6: Country

Question 10B: What are the major religions of Canada?

Subject

Canada Uhm, well, Canada is split between the French sector, as well as English speaking sector, which given those two warring factions and how that conflict rather manifests itself in the language debate. Should there be French, should the official language be French or should it be English. Um, given how language is so closely ties to religion, I imagine that it's probably Protestant versus Catholic, as well. Although that is not an issue that surfaces so much, that's my thought. So it's probably two religions.

Analysis

LR1

RS1
Lang(people(Canada)) = {French, English} — M Recall

RS2
Lang(people(Canada)) <==> Mjr_rlgn(people(Canada)) — PBK

RS3
Lang(people(Canada)) = {French, } <==>
Mjr_rlgn(people(Canada))={R_Cath,.} — PBK
Lang(people(Canada)) = {French,} — PBK

Mjr_rlgn(people(Canada)) = {R_Cath, .} — MI

RS4
Lang(people(Canada))={English, } <==>
Mjr_rlgn(people(Canada)) = {Protestant, } — PBK
Lang(people(Canada)) = {English,} — PBK

Mjr_rlgn(people(Canada)) = {Protestant, ..} — MI

Conclusion:
RS3: Mjr_rlgn(people(Canada)) = {R_Cath, .}
RS4: Mjr_rlgn(people(Canada)) = {Protestant, ..}

Mjr_rlgns(Canada) = {R_Cath, Protestant}

Figure 7. Example Protocol

Transforms	Country names unknown	Country names known
Gen-A	0	0
Spec-A	18	7
Sim-A	12	2
Dis-A	5	0
Gen-R	0	3
Spec-R	2	6
Sim-R	1	0
Dis-R	3	0
MI based	122	94
Source of Knowledge		
M Recall	0	47
GBK	124	24
PBK	176	181
RS	33	22
Eq. Class	2	3

Figure 8

Question 18B: What is the relationship between Vietnam and the USA?

Subject

I would say strained. They are communistic and we still have some problems with our PR and our POWs that are still there and getting them out. We have had some cooperation with them with POWs and getting the bodies out lately.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(Cntry, USA) = strained PBK
Govt_type(Vietnam) = cmnst GBK

Rltnshp(Vietnam, USA) = strained MI

LR2
RS1
PR(Cntry, USA) = poor <==> Rltnshp(Cntry, USA) = strained PBK
PR(Cntry, USA) = poor PBK

Rltnshp(Cntry, USA) = strained MI

LR3
RS1
Hold_POWs(Cntry) = true <==> Rltnshp(Cntry, USA) = strained PBK
Hold_POWs(Vietnam) = true PBK

Rltnshp(Cntry, USA) = strained MI

Conclusion:
LR1: Rltnshp(Vietnam, USA) = strained
LR2: Rltnshp(Vietnam, USA) = strained
LR3: Rltnshp(Vietnam, USA) = strained

Rltnshp(Vietnam, USA) = strained

Figure 9. Example Protocol

Question 18B: What is the relationship between Vietnam and the USA?

Subject

Um, we don't have relations with them at this point. That was pretty much cutoff a few years ago. They've just started to communicate with them (USA?) now. I wouldn't say hostile but probably strained.

Analysis

LR1

RS1

Comm(USA,Cntry,past) = none <==> Rltnshp(Cntry, USA,past) = strained PBK

Comm(USA,Vietnam,past) = none, PBK

Rltnshp(USA,Vietnam,past) = strained MI

LR2

RS1

Comm(USA,Cntry,now) = normal<==> Rltnshp(USA,Cntry,now) = normal PBK

Comm(USA,Vietnam,now) = starting_up_again PBK

Rltnshp(USA,Vietnam,now) = getting better MI

Conclusion:

LR1: Rltnshp(USA,Vietnam,past) = strained

LR2: Rltnshp(USA,Vietnam,now) = getting better

Rltnshp(Vietnam, USA) = poor but getting better

Figure 10. Example Protocol

Question 1A: What is the type of government in DEF (Angola)?

Subject

It is trading with us. That is good. State press. It's not a totally a free country. I don't think it is communist, but I don't think it is totally free, like the United States. ... Type of government. I am not positive that it is communistic, but I don't know the types of government. What other types are there? I can't think of them.

Analysis

LR1

RS1

Trad_prtnr(Cntry) = {USA, ... } <==> Rltnshp(USA, Cntry) = good	PBK
Trad_prtnr(DEF) = {USA, ... }	GBK
Rltnshp(USA, DEF) = good	MI

RS2

Rltnshp(USA, Cntry) = good <==> Govt_type(Cntry) ≠ cmnst	PBK
Rltnshp(USA, DEF) = good	RS1
Govt_type(Cntry) ≠ cmnst	MI

RS3

Press_type(Cntry) = state <==> Pol_sys(Cntry) ≠ free	PBK
Press_type(DEF) = state	GBK
Pol_sys(DEF) ≠ free	MI

RS4

Pol_sys(Cntry) ≠ free <==> Govt_type(Cntry) = cmnst	PBK
Pol_sys(DEF) ≠ free	RS3
Govt_type(DEF) = cmnst	MI

RS5

Prsnl_knldge(X) = low <==> Certainty((Cnclsn-abt(X)) = low	PBK-meta
Prsnl_knldge(Govt_type) = low	PBK
Certainty(Cnclsn-abt(Govt_type)) = low	MI

Conclusion:
Govt_type(DEF) = cmnst: Certainty= low

Figure 11. Example Protocol

Question 2A: What is the type of government in VWX (Italy)?

Subject

VWX. Type of government. Mixed press, high literacy rate. Okay, since the literacy rate is high I'd give it a democratic kind of government for VWX. So it seems to be a trend there. Services, industry, agriculture, Roman Catholic, West Germany, France, USA, steel, autos. Shoes? ((laughs) medium.

Analysis

LR1
RS1
Lit_rate(Cntry) = high <==> Govt_type(Cntry) = democracy PBK
Lit_rate(VWX) = high GBK

Govt_type(VWX) = democracy MI

LR2
RS1
Cntry_type 1 db properties {Wrk_frc = {services, industry, agric.}, Mjr_rlgn = R_Cath, trad_part = {W. Germ., France, USA}, Mjr_ind = {steel, autos, shoes}, PCI = medium} PBK
Govt_type(Cntry_type 1) = democracy PBK

RS2
VWX db properties {RS2}

VWX SPEC Cntry_type 1 SPEC-A
Govt_type(VWX) = democracy MI

Conclusion:
LR1: Govt_type(VWX) = democracy
LR2: Govt_type(VWX) = democracy

Govt_type(VWX) = democracy

Figure 12. Example Protocol

Question 8B: What is the type of labor force for Vietnam?

Subject

Primarily rural and agricultural. I just wouldn't think Vietnam would have that much industry. That again is going back to my association with the low economic status of many of the films that I have seen about them.

Analysis

LR1
RS1
Wrk_frc(Vietnam) = {rural, agric} M Recall

LR2
RS1
Econ_status(Cntry) = low <==> Wrk_frc(Cntry) = {rural, agric} PBK
Econ_status(Vietnam) = low PBK

Wrk_frc(Vietnam) = {rural, agric} MI

Conclusion:
LR1: Wrk_frc(Vietnam) = {rural, agric}
LR2: Wrk_frc(Vietnam) = {rural, agric}

Wrk_frc(Vietnam) = {rural, agric}

Figure 13. Example Protocol

Question 10A: What are the major religions in JKL (Canada)?

Subject

S: Parliamentary democracy, literacy rate very high, industry services. I would say, uh, for the religion would be the same thing- Roman Catholic.
I: Ok.
S: And my reason being is that it is basically very similar to other one.
I: Yeah, OK.

(Note: The other one refers to the following dialog from Q9)
S: Democratic republic. I'd go with um, religion here I would go with Roman Catholic as the major religion. Uh, steel, autos, chemicals.
I: What about the religion being Catholic? How did you get that answer?
S: Well they could read, and you know, the literacy rate is ..
I: Oh, the literacy rate is high?
S: Yeah, and you know, big trade, big industry being steel, autos, chemicals, you know, a lot of working class people.

Analysis

LR1
RS1

JKL SIM GHI: CX (Govt_type, Lit_rate, Wrk_frc)	Computed-GBK
CX <==> Mjr_rlgn	PBK
Mjr_rlgn(GHI) = R_Cath	GBK
Mjr_rlgn(JKL) = R_Cath	SIM-A

Figure 14. Example Protocol

Question 8A: What is the type of labor force for HIJ (Vietnam)?

Subject

S: The last column. HIJ. Communist state, medium high, agricultural services. I'd go with agricultural services, the reason being that their major industry is food processing and that is related to agriculture.

Analysis

RS1

Mjr_ind(Cntry) = {food proc,..} <==> Mjr_ind(Cntry) = {agric,..}	PBK
Mjr_ind(HIJ) = {food_proc,..}	GBK
Mjr_ind(HIJ) = {agric,..}	MI

RS2

Mjr_ind(Ctry) = {agric,..} <==> Wrk_frc(Ctry) = {agric,..}	PBK
Mjr_ind(HIJ) = {agric,..}	RS1
Wrk_frc(HIJ) = {agric,services,..}	MI

Figure 15. Example Protocol

Appendix

This appendix contains the complete verbal protocols produced by the eight subjects in response to the 18 questions and the analysis of those protocols. The analyses are organized first by question, and within question, by subject. For each question, the first four subjects used the table with the nonsense name while the last four subjects used the table with the actual country names. The questions (denoted "A" and "B") reflect this difference (note: for the nonsense-named countries, the actual name of the country is shown in parentheses).

In the analyses, the following abbreviations are used to describe parts of the analysis:

LR	Line of Reasoning
RS	Reasoning Step
PBK	Personal Background Knowledge
GBK	Given Background Knowledge (contained in the table)
M Recall	Memory Recall
MI	Mutual Implication
SPEC-A	Specialization - Argument
GEN-A	Generalization - Argument
SIM-A	Similization - Argument
DIS-A	Dissimilization - Argument
SPEC-R	Specialization - Referent
GEN-R	Generalization - Referent
SIM-R	Similization - Referent
DIS-R	Dissimilization - Referent
Eq. Class	Equivalence Class

Abbreviations were also used within the analyses when the complete name of a term was too long. The abbreviations are formed either by dropping the vowels from the word (e.g., cmnst = communist) or by taking the first 3 or 4 letters of a word, whichever was shorter and/or easier to understand. The abbreviations for the attributes in the table follow.

Govt_type	Government type
Press_type	Press type
Lit_rate	Literacy rate
Wrk_frc	Work force
Mjr_rlgn	Major religion

Trad_prtnr	Trading partners
Mjr_ind	Major industry
PCI	Per capita income
Rltnshp	Relationship (used as Rltnshp(Cntry, USA))

Question 1A:
What is the type of government in DEF (Angola)?

Subject 1

It is trading with us. That is good. State press. It's not a totally a free country. I don't think it is communist, but I don't think it is totally free, like the United States. ... Type of government. I am not positive that it is communistic, but I don't know the types of government. What other types are there? I can't think of them.

Analysis

LR1

RS1

Trad_prtnr(Cntry) = {USA, ... } <==> Rltnshp(USA, Cntry) = good	PBK
Trad_prtnr(DEF) = {USA, ... }	GBK
Rltnshp(USA, DEF) = good	MI

RS2

Rltnshp(USA, Cntry) = good <==> Govt_type(Cntry) ≠ cmnst	PBK
Rltnshp(USA, DEF) = good	RS1
Govt_type(Cntry) ≠ cmnst	MI

RS3

Press_type(Cntry) = state <==> Pol_sys(Cntry) ≠ free	PBK
Press_type(DEF) = state	GBK
Pol_sys(DEF) ≠ free	MI

RS4

Pol_sys(Cntry) ≠ free <==> Govt_type(Cntry) = cmnst	PBK
Pol_sys(DEF) ≠ free	RS3
Govt_type(DEF) = cmnst	MI

RS5

Prsnl_knldge(X) = low <==> Certainty((Cnclsn-abt(X)) = low	PBK-meta
Prsnl_knldge(Govt_type) = low	PBK
Certainty(Cnclsn-abt(Govt_type)) = low	MI

Conclusion:
Govt_type(DEF) = cmnst: Certainty= low

Subject 2

S: The next line I would say would be communist. Uh, okay, let's go with communist. (laughs)
I: For DEF?
S: Yeah.
I: How come?
S;: Well maybe it would be a democracy. See, you are ma...ng me change my mind.

I: I am?
S: Yeah.
I: I am not asking you, I am not doubting you. I don't know the right answers.
S: OK
I: I just want to clarify why you think that. That is the whole point of this- to figure out what goes into coming to an answer.
S: So I would say it would be a democracy because its state, USA, major industry, high per capita income. OK?
I: OK

Analysis

LR1
RS1
Govt_type(DEF) = cmnst — Guess

RS2
Challenged(belief) <==> Strength(belief) = reduced — PBK- meta
Challenged(Cnclsn(RS1)) — RS2

Strength(belief) = reduced — MI

RS2
Strength(belief) = reduced <==> Reverse(belief)
Strength(Cnclsn(RS1)) = reduced

Reverse(Cnclsn(RS1))

RS3
Result(Reverse(Cnclsn(RS1))) = Govt_type(DEF) = democracy

RS4
Exp. Assertion: ~Challenged(belief)

LR2
RS1
Cntry_type 1 db properties {Press_type(Cntry) = state &
Trad_prtnr(Cntry) = {USA, ..} &
Mjr_ind(Cntry) = {cotton_goods, fishmeal, ..} &
PCI(Cntry) = high} — PBK
Govt_type(Cntry_type 1) = democracy — PBK

RS2
DEF db properties {RS5} — GBK

DEF SPEC Cntry_type 1 — SPEC-A
Govt_type(DEF) = democracy — MI

Conclusion:
LR1: Govt_type(DEF) = democracy
LR2: Govt_type(DEF) = democracy

Govt_type(DEF) = democracy

Subject 3

Press is a state-- communist government.

Analysis

LR1
RS1
Press_type(Cntry) = state ==> Govt_type(Cntry) = cmnst — PBK
Press_type(DEF) = state — GBK

Govt_type(DEF) = cmnst — MI

Subject 4

Type of government republic. I guess because the combination of medium low literacy rate and Roman Catholic and cotton goods make me think of Egypt or some Mediterranean country.

Analysis

LR1
RS1
Literacy_rate(Cntry) = med_low &
Mjr_rlgn(Cntry) = R_Cath &
Mjr_ind(Cntry) = {cotton_goods, .. } <==>
Identity(Cntry) = {Egypt V Mediterranean_cntry..} — PBK
Lit_rate(DEF) = med_low &
Mjr_rlgn(DEF) = Roman-catholic &
Mjr_ind (DEF) = {cotton_goods, .. } — GBK

Identity(DEF) = {Egypt V Mediterranean_cntry..} — MI

RS2
Govt_type(Egypt) = republic — PBK
Govt_type(Mediterranean_cntry) = republic — PBK
DEF SIM (Egypt V Mediterranean_cntry): CX
{Lit_rate, Mjr_rlgn, Mjr_ind} — RS1
CX <==> Govt_type — PBK

Govt_type(DEF) = republic — SIM-A

Question 1B:
What is the type of government in Angola?

Subject 5

Type of government is communist

Analysis

LR1
RS1
Govt_type(Angola) = cmnst — M Recall

Subject 6

Angola, I would say that it is communist. I hear about it on the news so much.

Analysis

LR1
RS1
Govt_type(Angola) = Cmnst — M Recall

LR2
RS2
News_Frqncy(Cntry) = high <==> Govt_type(Cntry) = Cmnst — PBK
News_Frqncy(Angola) = high — PBK

Govt_type(Angola) = Cmnst — MI

Conclusion:
LR1: Govt_type(Angola) = Cmnst
LR2: Govt_type(Angola) = Cmnst

Govt_type(Angola) = Cmnst

Subject 7

Next one is Angola. Type of government. Again, uh, it shows my complete lack of ignorance in that part of the world. (laughs) I don't want to go to Africa. I think they are communists but that is just from my impression. I mean I know there is an ongoing civil war there and we're constantly sending troops in, but.

Analysis

LR1
RS1
Govt_type(Angola) = cmnst — M Recall

RS2
Personal_knowledge(X) = low <==> Certainty(X) = low — PBK
Personal_knowledge(Govt_type(Angola)) = low — PBK

Certainty(Govt_type(Angola)) = low — MI

LR2
RS1
Mil_status(Cntry) = {civil war, troops being sent in by USA} <==>
Govt_type(Angola) = cmnst — PBK
Mil_status(Angola) = {civil war, troops being sent in by USA} — PBK

Govt_type(Angola) = cmnst — MI

Conclusion:
LR1: Govt_type(Angola) = cmnst
LR1: Certainty(Govt_type(Angola)) = low
LR2: Govt_type(Angola) = cmnst

Govt_type(Angola) = cmnst

Subject 8

The type of the government I would think would be... I don't think it is a strict communist country. Is it? I would think it would lean towards that though.

Analysis

LR1
RS1
Govt_type(Angola) = leans towards cmnst — M Recall

RS2
Personal_knowledge(X) = low <==> Certainty(X) = low — PBK
Personal_knowledge(Govt_type(Angola)) = low — PBK

Certainty(Govt_type(Angola)) = low — MI

Question 2A:
What is the type of government in VWX (Italy)?

Subject 1

VWX. Type of government. Mixed press, high literacy rate. Okay, since the literacy rate is high I'd give it a democratic kind of government for VWX. So it seems to be a trend there. Services, industry, agriculture, Roman Catholic, West Germany, France, USA, steel, autos. Shoes? ((laughs) medium.

Analysis

LR1
RS1
Lit_rate(Cntry) = high <==> Govt_type(Cntry) = democracy — PBK
Lit_rate(VWX) = high — GBK

Govt_type(VWX) = democracy — MI

LR2
RS1
Cntry_type 1 db properties {Wrk_frc = {services, industry, agric.}, Mjr_rlgn = R_Cath, trad_part = {W. Germ., France, USA}, Mjr_ind = {steel, autos, shoes}, PCI = medium} — PBK
Govt_type(Cntry_type 1) = democracy — PBK

RS2
VWX db properties {RS2}

VWX SPEC Cntry_type 1 SPEC-A
Govt_type(VWX) = democracy MI

Conclusion:
LR1: Govt_type(VWX) = democracy
LR2: Govt_type(VWX) = democracy

Govt_type(VWX) = democracy

Subject_2

Next. Mixed, high, mixed, high, services. Roman Catholic. West Germany, France, USA. I would say this would be, uh, you see, this chart doesn't make much sense because you think you have something, and you match something, and it's different. Mixed, high, services. OK. I would say this is a parliamentary democracy, based on their major industry.

Analysis

LR1
RS1
VWX db properties {Press_type = mixed, Lit_rate = high, Mjr_rlgn = R_Cath, trad_part = W. Germ, France, USA} GBK

No inference is drawn

RS2
Mjr_ind(Cntry) = {steel, auto, shoes,..} <==>
Govt_type(Cntry) = parliamentary democracy PBK
Mjr_ind(VWX) = {steel, autos, shoes,..} GBK

Govt_type(VWX) = Parliamentary_democracy MI

Subject_3

Press is mixed, means there is some state influence. Steel, autos, shoes. What is a type of government that ... probably parliament of some type. In Parliamentary countries the people have a say but it's not quite a democracy.

Analysis

LR1
RS1
Press_type(Cntry) = mixed <==> State_inf(Press, Cntry) = some PBK
Press_type(VWX) = mixed GBK

State_inf(Press, VWX) = some MI

RS2
Mjr_ind(Cntry) = {steel, autos, shoes, ..} <==> Govt_type(Cntry) = Parliamentary_democracy — PBK
Mjr_ind(VWX) = {steel, autos,shoes,..} — GBK

Govt_type(VWX) = Parliamentary_democracy — MI

RS3
State_inf(Press, Cntry) = some <==>
Govt_type(Cntry) = Parliamentary_democracy — PBK
State_inf(Press, VWX) = some — RS1

Govt_type(VWX) = Parliamentary_democracy — MI

Subject 4

I am going to put democracy. It seems to conform to the western world, steel, and all that stuff.

Analysis

LR1
RS1
Mjr_ind(Cntry) = {steel,..} <==> Cntry SIM W_W_cntry in CX {Mjr_ind, Pol_sys..} — PBK
Mjr_ind(VWX) = {steel,..} — GBK

VWX SIM W_W_cntry in CX (Mjr_ind, Pol_sys) — SIM-A

RS2
VWX SIM W_W_cntry : CX (Mjr_ind, Pol_sys) — RS1
Govt_type SPEC Pol_sys — PBK
Govt_type(W_W_cntry) = democracy — PBK

Govt_type(VWX) = democracy — MI

Question 2B:
What is the type of government in Italy?

Subject 5

Italy. the government is socialist.

Analysis

LR1
RS1
Govt_type(Italy) = socialist — M Recall

Subject 6

Italy, I think of Mussolini and I think of something behind the Iron Curtain. so I go with Italy as communist.

Analysis

LR1
RS1

Past_ruler(Cntry) = {Mussolini} <==> Loc(Cntry) = Behnd_Iron_Curtain	PBK
Past_ruler(Italy) = {Mussolini}	PBK
Loc(Italy) = Behnd_Iron_Curtain	MI

RS2

Location(Cntry) = {Behnd_Iron_Curtain}<==> Govt_type(Cntry) = cmnst	PBK
Location(Italy) = {Behnd_Iron_Curtain}	PBK
Govt_type(Italy) = Cmnst	MI

Subject_7

Italy, type of government. I don't know. It changes. They've had like what, 45 governments since post-war, uh, since world war two? It's parliamentarian type of government. It is a democracy. I mean, Italy is a member of NATO as we speak. So, um, I wish I knew exactly what it would be called. Socialist. Socialist as well.

Analysis

LR1
RS1

#_govt_chngs_snc_WW2(Italy) = 45	PBK
#_govt_chngs_snc_WW2(Cntry) = 45 <==> #_govt_chngs_snc_WW2(Cntry) = high	PBK
#_govt_chngs_snc_WW2(Italy) = high	MI

RS2

#_govt_chngs_snc_WW2(Cntry) = high <==> Govt_type(Cntry) = unstable	PBK
#_govt_chngs_snc_WW2(Italy) = high	RS1
Govt_type(Italy) = unstable	MI

LR2
RS1

Govt_type(Italy) = democracy	M Recall

LR3
RS1

Mbr(Cntry, NATO) <==> Govt_type(Cntry) = democracy	PBK
Mbr(Italy, NATO)	PBK
Govt_type(Italy) = democracy	MI

RS2
Govt_type(Cntry, past) = unstable <==> Govt_type(Cntry,past) ≠
Govt_type(Cntry,now) PBK
Govt_type(Italy, past) = unstable PBK

Govt_type(Italy,past) ≠ Govt_type(Italy,now) MI

RS3
Govt_type(Italy, past) = democracy RS3,4
Govt_type(Italy) = unstable RS2

Govt_type (Italy,now) = socialism MI & RS5

Conclusion:
LR1: Govt_type(Italy) = unstable
LR2: Govt_type(Italy) = democracy
LR3: Govt_type (Italy,now) = socialism

Govt_type(Italy) = {democracy, socialist}

Subject 8

Type of government for Italy. They are a democratic republic, I believe. Yeah. They have a parliament. Um. Let's see.

Analysis

LR1
RS1
Govt_type(Italy) = democratic_republic M Recall

LR2
RS1
Has_parliament(Cntry) = yes <==> Govt_type(Cntry) = democratic_republic PBK
Has_parliament(Italy) = yes PBK

Govt_type(Italy) = democratic_republic MI

Conclusion:
LR1: Govt_type(Italy) = democratic_republic
LR2: Govt_type(Italy) = democratic_republic

Govt_type(Italy) = democratic_republic

Question 3A:
What is the type of Government for BCD (Peru)?

Subject 1

BCD. I'll go with a democratic republican (sic) because it has a medium high literacy rate.

Analysis

LR1
RS1
Lit_rate(Cntry) = med_high <==> Govt_type(Cntry) = democratic_republican — PBK
Lit_rate(BCD) = med_high — GBK

Govt_type(BCD) = democratic_republican — MI

Subject 2

BCD is, uh, I would say this would probably be democratic republic, I was going based on a lot of similarity between BCD and GHI.

Analysis

LR1
RS1
BCD SIM GHI : CX (Govt_type, Press_type, Lit_rate, Mjr_rlgn, PCI) — Computed GBK
Govt_type(GHI) = democratic_republic — GBK

Govt_type(BCD) = democratic_republic — SIM

Subject 3

For press I said it was either private or mixed because the country has normal relations with the USA, the trading partners are the USA, W. Germany and Japan, so there is probably not a lot of restrictions there. The religion is Roman Catholic, which means also that the government is probably democratic. Also because the trading partners with the USA, so the country is probably a free country, so the government is probably democratic or free.

Analysis

LR1
RS1
Rel(Cntry, USA) = normal <==> #_govt_rstrctn(Cntry) = few — PBK
Rel(BCD, USA) = normal — GBK

#_govt_rstrctn(BCD) = few — MI

RS2
Trad_prtnr(Cntry) = {USA, W. Germ., Japan} <==>
#_govt_rstrctn(Cntry) = few — PBK
Trad_prtnr(BCD) = {USA, W. Germ., Japan .. } — GBK

#_govt_rstrctn(BCD) = few — MI

RS3
#_govt_rstrctn(Cntry) = few <==> Press_type(Cntry) = free V mixed — PBK
#_govt_rstrctn(BCD) = few — RS1&RS2

Press_type(BCD) = free V mixed — MI

RS4
Press_type(Cntry) = free V mixed <==>
Govt_type(Cntry) = free — PBK Implicit
Press_type(BCD) = free V mixed — RS3

Govt_type(BCD) = democracy — MI

LR2
RS1
Mjr_rlgn(Cntry) = {R. Cath., .} <==> Govt_type(Cntry) = democracy — PBK
Mjr_rlgn(BCD) = {R.Cath., ..} — GBK

Govt_type(BCD) = democracy — MI

LR3
RS1
Trad_prtnr(Cntry) = {USA, W. Germ., Japan} <==>
Govt_type(Cntry) = free_govt — PBK
Trad_prtnr(BCD) = {USA, W. Germ, Japan } — GBK

Govt_type(BCD) = free_govt — MI

RS2
Govt_type(BCD) = free_govt — RS6
Eq. class: {free_govt, democracy — PBK-implicit

Govt_type(BCD) = democracy — Eq. class

Conclusion:
LR1: Govt_type(BCD) = democracy
LR2: Govt_type(BCD) = democracy

Govt_type(BCD) = democracy

Subject 4

Better put republic for BCD because it is a rare communist country that has normal relations with the USA.

Analysis

LR1
RS1
Rltnshp(USA, Cntry) = normal <==> Govt_type(Cntry) ≠ cmnst — PBK
Rltnshp(USA, BCD) = normal — GBK

Govt_type(Cntry) ≠ cmnst — MI

RS2
Govt_type(Cntry) ≠ cmnst <==> Govt_type(Cntry) = republic — PBK
Govt_type(BCD) ≠ cmnst — RS1

Govt_type(BCD) = republic — DIS-R

Question 3B:
What is the type of Government for Peru?

Subject 5

The government is nearly bankrupt because they don't make any weapons. I don't want to say that it is democratic but it still constitutes one.

Analysis

LR1
RS1
Mjr_ind(Cntry) = {few weapons} <==>
Econ_state(Cntry) = nearly bankrupt — PBK
Mjr_ind(Peru) = {few weapons} — PBK

Economy(Peru) = nearly bankrupt — MI

RS2
Govt_type(Peru) = functionally_democratic — M Recall
Govt_type(Peru) = ~ideal_democratic — M Recall

Subject 6

I would say more democratic and I don't know why I say that. I haven't really heard that much about Peru on the news. I have got to listen to NPR more.

Analysis

LR1
RS1
Govt_type(Peru) = democracy — M Recall

A Validation and Exploration of the Collins-Michalski Theory of Plausible Reasoning

Ryszard S. Michalski

To be published in *Reports of Machine Learning and Inference Laboratory*, November 1991.

LR2
RS1
News_frqncy(Cntry) = none <==> Govt_type(Cntry) ≠ cmnst PBK
News_frqncy(Peru) = none PBK

Govt_type(Peru) ≠ cmnst MI

RS2
Govt_type(Cntry) ≠ cmnst <==> Govt_type(Cntry) = democracy PBK
Govt_type(Peru) ≠ cmnst RS1

Govt_type(Peru) = democracy MI

Conclusion:
LR1: Govt_type(Peru) = democracy
LR2: Govt_type(Peru) = democracy

Govt_type(Peru) = democracy

Subject 7

Again it is a socialist democracy I believe. A couple of years ago they just had elections and they elected a fairly young, charismatic leader who everybody had great hopes for. But I don't, this country has so many problems, he hasn't been able to really turn them around. Anyway, I think, uh, I believe it is a social democratic government.

Analysis

LR1
RS1
Govt_type(Peru) = socialist_dmcrcy M Recall

LR2

RS1
Time(Elec(Cntry)) = recent <==> Have_elec(Cntry) = yes PBK
Time(Elec(Peru)) = recent PBK

Have_elec(Peru) = yes MI

RS2
Have_elec(Cntry) = yes <==> Govt_type(Cntry) = democracy PBK
Have_elec(Peru) = yes RS1

Govt_type(Peru) = democracy MI

LR3
RS1
State(Cntry) = many problems <==> Govt_type(Cntry) = social_dmcrcy PBK
State(Peru) = many problems PBK

Govt_type(Peru) = social_dmcrcy MI

LR4
RS1
Socialist_dmcrcy SPEC democracy: CX (Govt_type) PBK

Govt_type(Peru) = socialist_dmcrcy SPEC-R

Conclusion:
LR1: Govt_type(Peru) = socialist_dmcrcy
LR2: Govt_type(Peru) = democracy
LR3: Govt_type(Peru) = socialist_dmcrcy
LR4: Govt_type(Peru) = socialist_dmcrcy

Govt_type(Peru) = socialist_dmcrcy

Subject 8

Peru's type of government? That's also democratic country.

Analysis

LR1
RS1
Govt_type(Peru) = democracy M Recall

Question 4A:
What is the type of press in ABC (Afghanistan)?

Subject 1
I'd go with the press being state because they have hostile relations with USA so they are more of a controlled communist country.

Analysis

LR1
RS1
Rel(Cntry, USA) = hostile <==> Govt_type(Cntry) = cmnst PBK
Rel(ABC, USA) = hostile GBK

Govt_type(ABC) = cmnst MI

RS2
Govt_type(Cntry) = cmnst<==>Press_type(Cntry) = state PBK
Govt_type(ABC) = cmnst RS1

Press_type(ABC) = state MI

Subject 2

S: For ABC the press would be private.
I: If you could tell me why you think that, or how you derived that answer.
S: How I derived that. OK. Because you just shocked me. (laughs) No. I think it would be private because it's communist run. They wouldn't want, wouldn't want it to get out too much.*

* *(S is making a joke about psychology experiments)*
I: OK. Private means it is not, it's not, it's owned by people other than government.
S: So I told you I wasn't good at this. (laughs) Private means other than government.
I: Right.
S: So we would say state.
I: OK.
S: Other than the government, other than private.
I: It's just about definitions.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Press_type(Cntry) = state PBK
Govt_type(ABC) = cmnst GBK

Press_type(ABC) = state MI

Subject 3

S: Country ABC Press. This is somewhere in the East. This country is communist and therefore the press would be state controlled rather than privately or mixed or open. Is that the right interpretation of state, that is controlled by the country?
I: Yes.
S: What does mixed mean as far as press, can you tell me, can you answer questions like that?
I: Yes, mixed would be state and privately owned (e.g., USA Today).
S; Can I do either or?
I: Yes, as long as you tell me why.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Press_type(Cntry) = state PBK
Govt_type(ABC) = cmnst GBK

Press_type(ABC) = state MI

Subject 4

Press is state only because it is a communist country and as far as I'm concerned communist countries have state controlled press.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Press_type(Cntry) = state PBK
Govt_type(ABC) = cmnst GBK

Press_type(ABC) = state MI

Question 4B:
What is the type of press in Afghanistan?

Subject 5

That's a state press.

Analysis

LR1
RS1
Press_type(Afghanistan) = state — M Recall

Subject 6

I would say it is state. I associate communist with state run press.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Press_type(Cntry) = state — PBK
Govt_type(Afghanistan) = cmnst — GBK

Press_type(Afghanistan) = state — MI

Subject 7

Well given that I know they are at war now, even, despite the withdrawal of Soviet troops, I imagine that the press is merely a controlled Soviet type of press, very limited. Oh, my choices are mixed, state, and private. Well no doubt it is state, given the war situation there.

Analysis

LR1
RS1
Mil_intrvntn(Cntry,Cntry_w_cvl_wr) <==>
Pol_inf(Cntry,Cntry_w_cvl_wr) — PBK
Pol_inf(Cntry,Cntry_w_cvl_wr) <==>
Press_type(Cntry,Cntry_w_cvl_wr) SIM Press_type(Cntry) — PBK
Mil_intrvntn(USSR, Afghanistan) — PBK

Press_type(Afghanistan) SIM Press_type(USSR) — MI

RS2
Press_type(USSR) = state — PBK
Press_type(Afghanistan) SIM Press_type(USSR) — RS1

Press_type(Afghanistan) = state — SIM-A

LR2
RS1
State(Cntry) = at_war <==> Press_type(Cntry) = state_controlled PBK
State(Afghanistan) = at_war PBK

Press_type(Afghanistan) = state_controlled MI

LR3
RS1
Eq. class: {state, state_controlled} Eq. class

Conclusion:
LR1: Press_type(Afghanistan) = state
LR2: Press_type(Afghanistan) = state_controlled
LR3: Eq. class: {state, state_controlled}

Press_type(Afghanistan) = state

Subject 8

S: Let's see. They are a communist government. They have a very low literacy rate and they're Moslem. I would say that it's a state press probably because it's a communist country. I would believe that they would have a lot of influence as far as what's published.

Analysis

LR1
RS1
Afghanistan db properties {Govt_type = cmnst, Lit_rate = very low,
Mjr_rlgn = Moslem}* GBK

RS2
Govt_type(Cntry) = cmnst <==> Press_type(Cntry) = state PBK
Govt_type(Afghanistan) = cmnst GBK

Press_type(Afghanistan) = state MI

Comment:
* This RS was not used in generating the inference.

Question 5A:
What is the type of press in BCD (Peru)?

Subject 1
S: Press. Hm. Maybe it is state, maybe mixed for BCD.
I: Why is that?
S: Hm. Well, I'd have to go more on the mixed because they gotta medium high literacy rate. (pointing to STU). So they have a medium and they have a state (press) and they gotta low per capita income which kinda connects with a state press more. And normal relations. So either mixed or state. That is a hard one. Either one. I guess state maybe more.

Analysis

LR1
RS1

Lit_rate(Cntry) = med_high <==> Press_type(Cntry) = mixed	PBK
Lit_rate(BCD) = med_high	GBK
Press_type(BCD) = mixed	MI

RS2

PCI(Cntry) = low <==> Press_type(Cntry) = state	PBK
PCI(STU) = low	GBK
Press_type(STU) = state	MI

RS3

BCD SIM STU: CX(Lit_rate, PCI)	GBK
Press_type(BCD) = state	SIM-A

LR2
RS1

Rltnshp(Cntry, USA) = normal <==> Press_type(Cntry) = free	PBK
BCD DIS STU: CX(Rltnshp(Cntry, USA))	GBK
Press_type(STU) = state	GBK
Press_type(BCD) ≠ state	DIS-R

Conclusion:
LR1: Press_type(BCD) = state
LR2: Press_type(BCD) ≠ state

Press_type(BCD) = {mixed V state}

Subject 2

S: BCD is, uh, I would say this would probably be mixed. I was going based on a lot of similarity between BCD and GHI.

Analysis

LR1
RS1

BCD SIM GHI: CX (Lit_rate, Wrk_frc, Trd_prtnr, Mjr_ind)	GBK
Press_type(BCD) = mixed	SIM-A

Subject 3

S: For Press I said it was either private or mixed because the country has normal relations with the USA, the trading partners are the USA, W. Germany and Japan so there is probably not a lot of restriction there.

Analysis

LR1
RS1
Rltnshp(Cntry, USA) = normal <==>
Press_type (Cntry) = {private V mixed} PBK
Rltnshp(BCD, USA) = normal GBK

Press_type(BCD) = {private V mixed} MI

LR2
RS1
Trad_prtnr(Cntry) = {USA, W. Ger., Japan} <==>
Govt_rstrctns(Cntry) = small PBK
Trad_prtnr(BCD) = {USA, W. Ger., Japan} GBK

Govt_rstrctns(BCD) = small MI

RS2
Govt_rstrctns(Cntry) = small <==>
Press_type(Cntry) = {private V mixed} PBK
Govt_rstrctns(BCD) = small RS2

Press_type(BCD) = {private V mixed} MI

Conclusion:
LR1: Press_type(BCD) = {private V mixed}
LR2: Press_type(BCD) = {private V mixed}

Press_type(BCD) = {private V mixed}

Subject 4

.. it is a rare communist country that has normal relations with the USA. I am going to put mixed for press because of the low income and high literacy don't go together. With a low income it does sound like a country with lot of resources. What is my logic here? It may be a, no I am going to change that to private because with a medium high literacy, good relations with USA and trading with the USA and Japan, it sounds like a country that is struggling but still trying to get along in a democratic sort of way. I will go with private.

*Analysis

LR1
RS1
PCI (Cntry) = low <==> Lit_rate(Cntry) = low PBK
PCI (BCD) = low GBK

Lit_rate(BCD) = low MI

RS3
Lit_rate(Cntry) = low <==> Press_type(Cntry) = state PBK
Lit_rate(BCD) = low RS2
Lit_rate(Cntry) = med_high <==> Press_type(Cntry) = ~state PBK
Lit_rate(BCD) = med_high GBK

Press_type(Cntry) = mixed DIS-A

RS4
Lit_rate(BCD) = med_high,&
Rltnshp(BCD,USA) = good &
Trad_prtnr(BCD) = {USA, Japan}<==>
identity(BCD) = {struggling, democracy} PBK
identity(BCD) = {struggling, democracy} <==> Press_type(BCD) = private PBK

Press_type(BCD) = private MI

*Comment:
We are not totally satisfied with this analysis. We will continue to work on this one later.

Question 5B:
What is the type of press in Peru?

Subject 5

The press is state.

Analysis

LR1
RS1
Press_type(Peru) = state M Recall

Subject 6

I associate it with democracy. I would say that it is mixed instead of private.

Analysis

LR1
RS1
Govt_type(Cntry) = democracy <==> Press_type(Cntry) = {mixed V private} PBK
Govt_type(Peru) = democracy GBK

Press_type(Peru) = {mixed V private} MI

Conclusion:
Press_type(Peru) = mixed*

*Comment:
It is unclear why subject chooses mixed rather than mixed V private.

Subject 7

S: Press? I know they have a lot of terrorist activity there as well and that has a tendency to scare government. Um, I imagine that the press is, while open to an extent, is controlled and censored. There are limitations to exactly what they can write and do.

Analysis

LR1

RS1

Lev_ter_act(Cntry) = high <==> Govt_state(Cntry) = scared	PBK
Lev_ter_act(Peru) = high	PBK
Govt_state(Peru) = scared	MI

RS2

Govt_state(Cntry) = scared <==> Press_type(Cntry) = {controlled, censored}	PBK
Govt_state(Peru) = scared	PBK
Press_type(Peru) = {controlled, censored}	MI

Subject 8

That is also a democratic country. Their press I believe would be mixed. I am not real sure that that's totally independent. For some reason I think a lot of those South American countries have a lot of state influence as far as the press goes.

Analysis

LR1

RS1

Govt_type(Peru) = democracy	M Recall

RS2

Govt_type(Cntry) = democracy <==> Press_type(Cntry) ≠ state	PBK
Govt_type(Peru) = democracy	RS1
Press_type(Peru) ≠ state	MI

RS3

Press_type(Cntry) ≠ state <==> Press_type(Cntry) = mixed V free	PBK
Press_type(Peru) ≠ state	RS2
Press_type(Peru) = mixed V free	MI

LR2

RS1

Inf(Govt(Cntry), Press) = significant <==> Press_type(Cntry) ≠ free	PBK
Inf(Govt(Peru), Press) = significant	PBK
Press_type(Peru) ≠ free	SPEC-A

Conclusion:
LR1: Press_type(Peru) = mixed V free
LR2: Press_type(Peru) ≠ free

Press_type(Peru) = mixed

Question 6A:
What is the literacy rate in MNO (Cuba)?

Subject 1

MNO. Communistic, state press, literacy rate. I'd go with low, because it's a communistic country. Industry, services, Roman Catholic, none. Communistic country and Roman Catholic. That is strange.

Analysis

LR1
RS1
MNO db properties {govt_type = cmnst, Press_type = state} GBK

RS2
Govt_type(Cntry) = cmnst <==> Lit_rate(Cntry) = low PBK
Govt_type(MNO) = cmnst GBK

Lit_rate(MNO) = low MI

Subject 2

S: Communist, state. Okay, so ABC was state. Um, their literacy rate would be very low.
I: Why is that?
S: Well, hm. They are communist, they're communist, so we were taught to kill. (laughs)
S; to kill communists?
I: No, so, they have a medium literacy rate. Okay?
I: What do you mean we were taught to kill?
S: (laughs) See I'm in a similar field as you, so I know what you're dealing with. You are playing with my mind.
I: I don't know what you mean.

Analysis

LR1
RS1
MNO SIM ABC: CX(Govt_type, Press_type) PBK
Lit_rate(ABC) = very low GBK

Lit_rate(MNO) = very low SIM-A

Subject 3
Type of government is communist, the type of press is state, industry and service produce textile that suggests sort of a blue collar workforce. Probably the literacy rate is low because those type

of countries like to keep their people oppressed. Also the income is low which suggests little education so they'd have higher learning power.

Analysis

LR1

RS1

Cntry_type 1 db properties {Govt_type = cmnst, Press_type = state,
Wrk_frc = ind, services, Mjr_ind = textile, PCI = low } PBK

Cntry_type (Cntry) = 1 <==> Wrk_frc(Cntry) = blue collar PBK

RS2

MNO db properties {RS1} GBK

MNO SPEC Cntry_type 1 SPEC-A

Wrk_frc(MNO) = blue collar MI

RS3

Wrk_frc(Cntry) = blue collar <==> Education_level(Cntry) = little PBK

Wrk_frc(MNO) = blue collar GBK

Education_level(MNO) = little (This is an implied conclusion) MI

RS4

Govt_type(Cntry)=cmnst <==>
Goal(Govt_type(Cntry), oppress(People(Cntry))) PBK

Lit_rate(Cntry) = low <==> oppress(People(Cntry)) PBK

Govt_type(MNO) = cmnst PBK

Do(Govt_type(MNO), Lit_rate(Cntry) = low) MI

RS4

Do(Govt_type(MNO), Lit_rate(Cntry) = low) LR3

Powerful(Govt_type(MNO)) PBK

Lit_rate(Cntry) = low MI

LR2

RS1

PCI(Cntry) = low <==> Lit_rate(Cntry) = low PBK

PCI(MNO) = low GBK

Lit_rate(MNO) = low MI

Conclusion:

LR1: Lit_rate(MNO) = low

LR2: Lit_rate(MNO) = low

Lit_rate(MNO) = low

Subject 4

I am going to put medium low. Again the communist system and the Roman Catholic presence and the fact that their industry seems to be a smokestack industry.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Lit_rate(Cntry) = med_low PBK
Govt_type(MNO) = cmnst GBK

Lit_rate(MNO) = med_low MI

LR2
RS1
Mjr_rlgn(Cntry) = {R_Cath., ..} <==> Lit_rate(Cntry) = med_low PBK
Mjr_rlgn(MNO) = {R_Cath., ..} GBK

Lit_rate(MNO) = med_low MI

LR3
RS1
Mjr_ind(Cntry) = (textiles, wood products.,...} <==>
Mjr_ind(Cntry) = smoke_stack_industry PBK
Mjr_ind(Cntry) = {smoke_stack_industry, ..} <==> Lit_rate(Cntry) = med_low PBK
Mjr_ind(MNO) = (textiles, wood products.,...} GBK

Lit_rate(MNO) = med_low MI

Conclusion:
LR1: Lit_rate(Cntry) = med_low
LR2: Lit_rate(Cntry) = med_low
LR3: Lit_rate(Cntry) = med_low

Lit_rate(Cntry) = med_low

Question 6B:
What is the literacy rate in Cuba?

Subject 5

Not answered

Subject_6

S: I would say it would be medium to medium high. I know that a lot of funding has gone into that country from communist [countries]. I have heard a lot about Cuba in the media.

Analysis

LR1

RS1

Cmnst_funding(Cntry) = high <==> Lit_rate(Cntry) = med V med_high	PBK
Cmnst_funding(Cuba) = high	PBK
Lit_rate(Cuba) = med V med_high	MI

Subject_7

Um, I don't know. Castro and his glorious revolution. I believe he really has improved the lot of his people. But from what to what? It's all relatively speaking. I think the literacy rate is still very low. Um. They have been so isolated for so many years. They have so many economic problems. I don't imagine. Again literacy is kind of luxury once the basics have been resolved and they haven't been resolved yet.

Analysis

LR1

RS1

Improvement(Cntry) = yes<==> Literacy_rate(Cntry) = increased	PBK
Caused(Castro, Improvement(Cuba))	PBK
Init_state(literacy_rate) = V low	PBK
Lit_rate(Cntry) = low, but not very low	MI

LR2

RS1

Low_edu(Cntry) <==> Lit_rate(Cntry) = low	PBK
Isolation(Cntry) <==> low_edu(Cntry)	PBK
Isolated(Cuba) = yes	PBK
Lit_rate(Cuba) = low	MI

LR3

RS1

Not_solved(basic_problems, Cntry) = true <==> devote_more_resources(basic_problems, Cntry) = yes	PBK
attention(Cntry, basics) PREC Importance(Cntry, luxury)	PBK
Not_solved(basic_problems, Cuba) = true	PBK
Devote_more_resources(basic_problems, Cntry) = yes <==> devote_less_resources(luxury, Cntry) = yes	PBK
High_lit_rate SPEC luxury in CX importance:	PBK
Devote_less_resources(Lit_rate, Cntry) = yes	MI

RS2
Devote_less_resources(Lit_rate, Cntry) = yes <==>
Lit_rate(Cntry) = low — Implicit-PBK
Devote_less_resources(Lit_rate, Cntry) = yes — RS1

Lit_rate(Cuba) = low — MI

RS3
Govt_type(Cuba) = cmnst — GBK
Govt_type(Cntry) = cmnst <==> failure(Cntry) = true — PBK
Low Lit_rate SPEC failure — PBK

Lit_rate(Cuba) = low — MI

Conclusion:
LR1: Lit_rate(Cntry) = low, but not very low
LR2: Lit_rate(Cuba) = low
LR3: Lit_rate(Cuba) = low

Lit_rate(Cuba) = very_low

Subject 8

Cuba. As far as their literacy rate. Let's see. A communist state. Uh, state run press. I would think that they're medium low. That's pretty much of a backward country at this point.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Lit_rate(Cntry) = low — PBK
Govt_type(Cuba) = cmnst — GBK

Lit_rate(Cuba) = low — MI

LR1
RS1
Press_type(Cntry) = state <==> Lit_rate(Cntry) = low — PBK
Press_type(Cuba) = state — GBK

Lit_rate(Cuba) = low — MI

LR1
RS1
Economy(Cntry) = poor <==> Lit_rate(Cntry) = low — PBK
Economy(Cuba) = poor — GBK

Lit_rate(Cuba) = low — MI

Conclusion:
LR1: Lit_rate(Cuba) = low
LR2: Lit_rate(Cuba) = low
LR3: Lit_rate(Cuba) = low

Lit_rate(Cuba) = low

Question 7A:
What is the type of labor force for EFG (Poland)?

Subject 1

I'd say agricultural for work force because it is a communist country, maybe rural, but it does have Roman Catholic. I guess agriculture and maybe rural because it is a communist country so I'd say they work more for their country.

Analysis

LR1
RS1

Govt_type(Cntry) = cmnst <==> Wrk_frc(Cntry) = {agric V rural, ..}	PBK
Govt_type(EFG) = cmnst	GBK

Wrk_frc(EFG) = {agric V rural, ..}	MI

LR2
RS1

Mjr_rlgn(Cntry) = {R_Cath ..} <==> Wrk_frc(Cntry) ≠ {agric, ..}	PBK
Mjr_rlgn(EFG) = {R_Cath, ..}	GBK

Wrk_frc(Cntry) ≠ agric	MI

LR3
RS1

Govt_type(Cntry) = cmnst <==> People(Cntry) = work harder	PBK
People(Cntry) = work harder <==> Wrk_frc(Cntry) = agric	PBK
Govt_type(EFG) = cmnst	GBK

Wrk_frc(EFG) = agric	MI

Conclusion:
LR1: Wrk_frc(EFG) = {agric V rural, ..}
LR2: Wrk_frc(Cntry) ≠ agric
LR3: Wrk_frc(EFG) = agric

Wrk_frc(EFG) = agric

Subject 2

Oh, they would be into services and industry, services and industry. That seems to be the work force of the high literacy rate.

Analysis

LR1
RS1
Lit_rate(Cntry) = high<==>Wrk_frc(Cntry) = {service, industry}

	Computed GBK
Lit_rate(EFG) = high	GBK
Wrk_frc(EFG) = {service, industry}	MI

Subject_3

S: Democratic republic, this is somewhere over there. Major religion, is there some reason why you have Roman Catholic everywhere. God where is this, it's a communist country and the major religion is Roman Catholic, that's really interesting. Oh, Oh, that's like, labor force, say like blue collar? Their major industry is shipbuilding, so that's industry. This is cool, I like correlating data and making inferences. Integrating data, does that tell you a lot about myself?

Analysis

LR1*
RL1

Govt_type(EFG) = democratic republic	incorrect perception of GBK
Govt_type(EFG) = cmnst	GBK
Mjr_rlgn(EFG) = {R_Cath, ..}	GBK
Identity(EFG)= unknown	

LR2
RS1

Shipbuilding SPEC industry	PBK
Mjr_ind(EFG) = {ship_building, .. }	GBK
Mjr_ind(EFG) = industry	SPEC-R

RS2

Mjr_ind(Cntry) = industry <==> Wrk_frc(Cntry) = {blue_collar..}	PBK
Mjr_ind(EFG) = industry	RS1
Wrk_frc(EFG) = {blue_collar..}	MI

Conclusion:
LR1: identity(EFG)= unknown
LR2: Wrk_frc(EFG) = {blue_collar..}

Wrk_frc(EFG) = {blue_collar..}

Comments:
*It would appear that the subject tried first to determine the work force by determining the identity of the country. When that failed, the subject turned to another approach.

Subject 4

Shipbuilding is the major industry so the labor force must be industry, I figure farmers don't make good shipbuilders.

Analysis

LR1
RS1
Mjr_ind(Cntry) = shipbuilding <==> Wrk_frc(Cntry) = industry — PBK
Mjr_ind(EFG) = shipbuilding — GBK

Wrk_frc(EFG) = industry — MI

LR2
RS1
Farmer DIS shipbuilder in CX(Wrk_frc) — PBK
Wrk_frc(EFG) = ship_builders — RS1

Wrk_frc(EFG) ≠ agric — DIS-A

RS2
Wrk_frc(Cntry) ≠ agric <==> Wrk_frc(Cntry) = {industry, services, ..} — GBK
Wrk_frc(EFG) ≠ agric — GBK

Wrk_frc(EFG) = {industry, services, ..} — MI

Conclusion:
LR1: Wrk_frc(EFG) = industry
LR2: Wrk_frc(EFG) = {industry, services, ..}

Wrk_frc(EFG) = industry

Question 7B:
What is the type of labor force for Poland?

Subject 5

The labor force is agriculture, services and industry and manufacturing.

Analysis

LR1
RS1
Wrk_frc(Poland) = {agric, services, industry, manufacturing} — M Recall

Subject 6

The work force is industrial and some agriculture there, I associate Poland with industry because of Walesa and Solidarity there. I associate with agriculture because of the ties with the Soviet Union.

Analysis

LR1
RS1
Sol_leader(Cntry) = Walesa <==> Wrk_frc(Cntry) = industry PBK
Sol_leader(Poland) = Walesa PBK

Wrk_frc(Poland) = industry MI

LR2
RS1
Pol_ties(Cntry) = USSR <==> Wrk_frc(Cntry) = agric PBK
Pol_ties(Poland) = USSR PBK

Wrk_frc(Poland) = agric MI

Conclusion:
LR1: Wrk_frc(Poland) = industry
LR2: Wrk_frc(Poland) = agric

Wrk_frc(Poland) = {industry, agric, ..}

Subject 7

Poland, work force is the question. Um, I think it is manufacturing. No excuse me, I think it's industry. I think it's raw materials, not consumer goods. I think it is more processing of raw materials as well as agriculture. Uh, how do I know that? I don't even know if that is right. It's, Poland has been for so long, for so many years, since it's, it's always, because of where it is located, unfortunately, historically it has been a passageway through which either the Russian troops move West, or the European troops move East. Um, it has survived despite all that but It has always been barely. So, that and given a very repressive communist regime, and hearing of the strikes in Gdansk, and Solidarity and so forth, may be there is a chance to reform their economy and make it more productive.

Analysis

LR1
RS1
Wrk_frc(Poland) = manufacturing M Recall

LR2
RS1
Wrk_frc(Poland) ≠ manufacturing M Recall

RS2
Wrk_frc(Poland) = industry M Recall
Raw materials, consumer goods SPEC industry

Wrk_frc(Poland) = raw materials SPEC-R

LR3
Wrk_frc(Poland) = agriculture — M Recall

Conclusion:
LR1: Wrk_frc(Poland) = manufacturing (rescinded in LR2)
LR2: Wrk_frc(Poland) = raw materials
LR3: Wrk_frc(Poland) = agriculture

Subject 8

S: Um, Poland's work force would probably be mostly industry and agriculture. The reason I say that is 'cause they have shipbuilding and down here I know that they're famous for that. What were you gonna say?
I: I was gonna say why?
S: Why? Because of shipbuilding. That is the only thing that comes to mind. I keep thinking of Lech Walesa and all those people at the ship yards.

Analysis

LR1
Wrk_frc(Poland) = {industry, agric,..} — M Recall

LR2
RS1
Mjr_ind(Cntry) = shipbuilding ==> Wrk_frc(Cntry) = industry — PBK
Mjr_ind(Poland) = shipbuilding — M Recall

Wrk_frc(Poland) = industry — MI

Conclusion:
LR1: Wrk_frc(Poland) = {industry, agric, ..}
LR2: Wrk_frc(Poland) = industry

Wrk_frc(Poland) = {industry, agric, ..}

Question 8A:
What is the type of labor force for HIJ (Vietnam)?

Subject 1

HIJ. Communist, state, medium high literacy rate. Workforce we don't know. Well, they got a mix of religions there. United States, Japan, Hong Kong, food processing, textiles-- very low. Unknown relationship. Hm. Workforce. I'd go with agricultural

Analysis

LR1

RS1

Cntry_type 1 db properties {Govt_type = cmnst, Press_type = state, Lit_rate = medium high, Wrk_frc = undefined, Mjr_rlgn = mix, Trad_prtnr = USA, Japan, Hong Kong, Mjr_ind, = food processing, textiles, PCI = very low} PBK

Wrk_frc(Cntry_type 1) = agric PBK

RS2

HIJ db properties {RS1} GBK

HIJ SPEC Cntry_type 1 SPEC-A

Wrk_frc(HIJ) = agric MI

Subject 2

S: The last column. HIJ. Communist state, medium high, agricultural services. I'd go with agricultural services, the reason being that their major industry is food processing and that is related to agriculture.

Analysis

RS1

Mjr_ind(Cntry) = {food proc,..} <==> Mjr_ind(Cntry) = {agric,..} PBK

Mjr_ind(HIJ) = {food_proc,..} GBK

Mjr_ind(HIJ) = {agric,..} MI

RS2

Mjr_ind(Ctry) = {agric,..} <==> Wrk_frc(Ctry) = {agric,..} PBK

Mjr_ind(HIJ) = {agric,..} RS1

Wrk_frc(HIJ) = {agric,services,..} MI

Subject 3

S: What is an animist? A major industry, food processing. Agriculture, major industry is food and textiles to produce these.

Analysis

LR1

RS1

Mjr_ind(Cntry) = {food proc, textiles} <==> Wrk_frc(Cntry) = {agric, ..} PBK

Mjr_ind(HIJ) = {food proc, textiles} GBK

Wrk_frc(HIJ) = {agric,..} MI

Subject 4

S: I would put industry for the same reason because their major industry is industrial workforce. They process food and they grow so I am going to put agricultural. Somebody has to grow textiles from cotton and somebody has to grow the food.

Analysis

LR1
RS1
Mjr_ind(Cntry) = industry <==> Wrk_frc(Cntry) = {industry} PBK
Eq. class: {food proc, textiles, industrial wrk_frc Eq. Class
Mjr_ind(HIJ) = {industrial wrk_frc} GBK

Wrk_frc(Cntry) = {industry} MI

LR2
RS1
Mjr_ind(Cntry) = {food process} <==> Wrk_frc(Cntry) = {agric} PBK
Mjr_ind(HIJ) = {food process} GBK

Wrk_frc(Cntry) = {agric} MI

RS2
Mjr_ind(Cntry) = {textiles} <==> Wrk_frc(Cntry) = {agric} PBK
Mjr_ind(HIJ) = {textiles} GBK

Wrk_frc(Cntry) = {agric} MI

Conclusion:
LR1: Wrk_frc(Cntry) = {industry}
LR2: Wrk_frc(Cntry) = {agric}

Wrk_frc(HIJ) = {agric, industry,..}

Question 8B:
What is the type of labor force for Vietnam?

Subject 5

The work force is predominantly agriculture with some services and some manufacturing and some limited industry.

Analysis

LR1
RS1
Wrk_frc(Vietnam) = {predominantly agriculture, some services, some manufacturing, some limited industry} M Recall

Subject_6

Primarily rural and agricultural. I just wouldn't think Vietnam would have that much industry. That again is going back to my association with the low economic status of many of the films that I have seen about them.

Analysis

LR1
RS1
Wrk_frc(Vietnam) = {rural, agric} M Recall

LR2
RS1
Econ_status(Cntry) = low <==> Wrk_frc(Cntry) = {rural, agric} PBK
Econ_status(Vietnam) = low PBK

Wrk_frc(Vietnam) = {rural, agric} MI

Conclusion:
LR1: Wrk_frc(Vietnam) = {rural, agric}
LR2: Wrk_frc(Vietnam) = {rural, agric}

Wrk_frc(Vietnam) = {rural, agric}

Subject_7

Vietnam. Work force. I think it is primarily agricultural. It is way behind pacific rim, the development of the rest of the pacific rim countries because of the Vietnam war. And the continuing state of, it is very poor. The refugees, there was a mass exodus of refugees, a brain drain, if you will, during the war, after the war, continuing still. Therefore that does not leave a lot of room to revolutionize, to modernize what little industry you might have, that might have survived the war. Uh, I think it is primarily agricultural.

Analysis

LR1
RS1
Wrk_frc(Vietnam) = {agric, ..} M Recall

LR2
RS1
Mil_stat(Cntry)=war <==> Econ_stat(Ctry) < Econ_stat(Nbors(Cntry)) PBK
Mil_status(Vietnam) = war PBK
Nbors(Vietnam) = Pacific_rim_cntries PBK

Econ_stat(Vietnam) < Econ_stat(Pacific_rim_cntries) MI

RS2

Econ_stat(Pacific_rim_countries) = high	PBK-Implicit
Econ_stat(Vietnam) < Econ_stat(Pacific_rim_cntries)	RS2
Econ_stat(Vietnam) = poor	

LR3

RS1

Mil_stat(Cntry)=at_war<==>Exodus(Cntry) & Brain_drain(Cntry)= high	PBK
Exodus(Cntry) & Brain_drain(Cntry)= high <==> Develop(Cntry) = slow	PBK
Exodus(Vietnam) & Brain_drain(Vietnam)= high	PBK
Develop(Vietnam) = slow	MI

RS2

Tendency(Cntry) = modernize <==> Change(Agric, mod_ind)	PBK
Develop(Cntry) = slow <==> Change(Agric, mod_ind) = slow	PBK
Develop(Vietnam) = slow	RS4
Change(Agric, mod_ind) = slow	MI

RS3

Change(Agric, mod_ind) = slow	RS5
Mjr_ind(Vietnam) = {agric, ..}	GBK
Wrk_frc(Vietnam) = {agric, ..}	MI

Conclusion:
LR1: Wrk_frc(Vietnam) = {agric, ..}
LR2: Econ_stat(Vietnam) = poor
LR3: Wrk_frc(Vietnam) = {agric, ..}

Wrk_frc(Vietnam) = {agric, ..}

Subject 8

S: I would say they are agricultural for the most part because they don't well, it says down there that their major industries are food processing and textiles. They don't, and they grow a lot of rice in Vietnam.

Analysis

LR1

RS1

Mjr_ind(Cntry) = {food_proc V textile}<==>Wrk_frc(Cntry) = {agric, ..}	PBK
Mjr_ind(Vietnam) = {food_proc, textiles}	GBK
Wrk_frc(Vietnam) = {agric, ..}	MI

LR2
RS1
Product_type(Cntry) = rice <==> Wrk_frc(Cntry) = agric — PBK
Product_type(Vietnam) = rice — M Recall

Wrk_frc(Vietnam) = agric — MI

Conclusion:
LR1: Wrk_frc(Vietnam) = agric
LR2: Wrk_frc(Vietnam) = agric

Wrk_frc(Vietnam) = agric

Question 9A:
What are the major religions in GHI (Brazil)?

Subject 1

Major religions. God, I am surprised so many are Roman Catholic. Um, sounds good for that one too, but I don't really know. Is there a connection? I'll go with Roman Catholic for GHI because it seems there is a kind of pattern for Roman Catholics. Cause there's for GHI and VWX they are basically the same forces, and then almost the same on major industries. Trading partners are about the same. Same with YZA so that is why I picked Roman Catholic.

Analysis

LR1
RS1
Typicality (Mjr_rlgn(Cntry) = {R_Cath}) = high — GBK

Mjr_rlgn(GHI) = {R_Cath} — SPEC-A

LR2
RS1
Mjr_rlgn(VWX) = {R_Cath, .} — PBK
GHI SIM VWX: CX (Wrk_frc, Mjr_ind, Trad_prtnr) — GBK
((Wrk_frc, Mjr_ind, Trad_prtnr) (Cntry))<==> Mjr_rlgn(Cntry) — PBK

Mjr_rlgn(GHI) = {R_Cath} — SIM-A

RS2
Mjr_rlgn(YZA) = {R_Cath, .} — PBK
GHI SIM YZA in CX(Wrk_frc, Mjr_ind, Trad_prtnr) — GBK
((Wrk_frc, Mjr_ind, Trad_prtnr) (Cntry))<==> Mjr_rlgn(Cntry) — PBK

Mjr_rlgn(GHI) = {R_Cath} — SIM-A

Conclusion:
LR1: Mjr_rlgn(GHI) = {R_Cath}
LR2: Mjr_rlgn(GHI) = {R_Cath}

Mjr_rlgn(GHI) = {R_Cath}

Subject 2

S: Democratic republic. I'd go with um, religion here I would go with Roman Catholic as the major religion. Uh, steel, autos, chemicals.
I: What about the religion being Catholic? How did you get that answer?
S: Well they could read, and you know, the literacy rate is ..
I: Oh, the literacy rate is high?
S: Yeah, and you know, big trade, big industry being steel, autos, chemicals, you know, a lot of working class people.

Analysis

LR1
RS1
Govt_type(Cntry) = dmcrtc_republic <==> Mjr_rlgn(Cntry) = R_Cath — PBK
Govt_type(GHI) = dmcrtc_republic — GBK

Mjr_rlgn(GHI) = R_Cath — MI

LR2
RS1
Lit_rate(Cntry) = high <==> Mjr_rlgn(Cntry) = R_Cath — PBK
Lit_rate(GHI) = high — GBK

Mjr_rlgn(GHI) = R_Cath — MI

LR3
RS1
Cntry_type 1 db properties {Mjr_ind = steel, autos, chemicals, Wrk_frc = blue collar, Trad_prtnr = USA, Japan, Neth'lnd} — PBK
Mjr_rlgn (Cntry_type 1) = R_Cath — PBK

RS2
GHI db properties {LR3, RS1} — GBK

GHI SPEC Cntry_type 1 — SPEC-A
Mjr_rlgn(GHI) = R_Cath — MI

Conclusion:
LR1: Mjr_rlgn(GHI) = R_Cath
LR2: Mjr_rlgn(GHI) = R_Cath
LR3: Mjr_rlgn(GHI) = R_Cath

Mjr_rlgn(GHI) = R_Cath

Subject 3
Government is democratic, press is private, major religion is probably Catholic and Protestant. Because it is a well developed country and that is the religion in those countries. It's not like an

eastern where you are going to have Islam or Buddhism. Most of the free countries are going to be Catholic or Protestant.

Analysis

LR1
RS1
Cntry_type (Cntry) = well_developed db properties {Govt_type = democracy, Press_type= private} PBK
Cntry_type (Cntry) = well_developed <==>
Mjr_rlgn(Cntry) = {R_Cath, Protestant,..} PBK

RS2
GHI db properties {RS1} GBK

Cntry_type(GHI) = well_developed SPEC-A
Mjr_rlgn(GHI) = {R_Cath, Protestant,..} MI

LR2
RS1
Developed(Cntry) = true <==> free(Cntry) = true PBK
Developed(Cntry) DIS eastern(Cntry) PBK
Mjr_rlgn(developed(Cntry)) DIS Mjr_rlgn(eastern(Cntry)) PBK
Mjr_rlgn(eastern(Cntry)) = {Islam, Buddhism, ..}
Developed(GHI) = true RS2

Mjr_rlgn(GHI) ≠ {Islam, Buddhism, ..} DIS-A

Conclusion:
LR1: Mjr_rlgn(GHI) = {R_Cath, Protestant,..}
LR2: Mjr_rlgn(GHI) ≠ {Islam, Buddhism, ..}

Mjr_rlgn(GHI)= {R_Cath, Protestant,..}

Subject 4

S: I am going to put Protestant under religion because again this sounds like a fairly high tech country that is enlightened and has a fairly high standard of living. Frequently the Catholic church is stronger in a country with lower literacy.

Analysis

LR1
RS1
Cntry_type (Cntry) = high tech db properties {attributes in the table for GHI} PBK
Cntry_type(Cntry) = high tech <==> Mjr_rlgn(Cntry) = Protestant PBK

RS2
GHI db properties {RS1} GBK

GHI SPEC Cntry_type 1 SPEC-A
Cntry_type(GHI) = high tech MI
Mjr_rlgn(GHI) = Protestant MI

LR2
RS1
Lit_rate(Cntry) = low <==> Mjr_rlgn(Cntry) = {R_Cath} PBK
Lit_rate(GHI) = high GBK

Mjr_rlgn(GHI) ≠ {R_Cath} DIS-A

Conclusion:
Mjr_rlgn(GHI) = Protestant
Mjr_rlgn(GHI) ≠ {R_Cath}

Mjr_rlgn(GHI) = Protestant

Question 9B:
What are the major religions in Brazil?

Subject 5

Predominantly Catholic although there are some Protestant.

Analysis

LR1
RS1
Mjr_rlgn(Brazil) = {predominantly Catholic, some Protestant} M Recall

Subject 6

Roman Catholic, I don't know why.

Analysis

LR1
RS1
Mjr_rlgn(Brazil) = {R_Cath} M Recall

Subject 7

S: Major religion I just know it is Catholicism. Roman Catholic. It's predominantly so in Latin America for a variety of reasons.

Analysis

LR1
RS1
Mjr_rlgn(Brazil) = {R_Cath} M Recall

LR2
RS1
Mjr_rlgn(Latin_America) = {R_Cath, ..} PBK
Brazil SPEC Latin_America PBK

Mjr_rlgn(Brazil) = {R_Cath} SPEC-A

Conclusion:
LR1: Mjr_rlgn(Brazil) = {R_Cath}
LR2: Mjr_rlgn(Brazil) = {R_Cath}

Mjr_rlgn(Brazil) = {R_Cath}

Subject 8

S: Major religions I would believe would be Roman Catholic 'cause most South American countries are.

Analysis

LR1
RS1
Mjr_rlgn(S. American countries) = {R_Cath} PBK
Brazil SPEC S. American cntry PBK

Mjr_rlgn (Brazil) = {R_Cath} SPEC-A

Question 10A:
What are the major religions in JKL (Canada)?

Subject 1

JKL, private, very high, industry, services, major religions we don't know. Trades with the United States. Steel, high and normal. Oh, that is a tough one. Major religions. U.S., steel, high, normal. I have no idea. Private, very high, industry, services, United States, steel, high, normal. Industry, services. I am not sure about the religions for JKL.

Analysis

LR1
RS1
Major_religion(JKL) = do not know

Subject 2

S: Parliamentary democracy, literacy rate very high, industry services. I would say, uh, for the religion would be the same thing- Roman Catholic.
I: Ok.
S: And my reason being is that it is basically very similar to other one.
I: Yeah, OK.

(Note: The other one refers to the following dialog from Q9)
S: Democratic republic. I'd go with um, religion here I would go with Roman Catholic as the major religion. Uh, steel, autos, chemicals.
I: What about the religion being Catholic? How did you get that answer?
S: Well they could read, and you know, the literacy rate is ..
I: Oh, the literacy rate is high?
S: Yeah, and you know, big trade, big industry being steel, autos, chemicals, you know, a lot of working class people.

Analysis

LR1
RS1

JKL SIM GHI: CX (Govt_type, Lit_rate, Wrk_frc)	Computed-GBK
CX <==> Mjr_rlgn	PBK
Mjr_rlgn(GHI) = R_Cath	GBK
Mjr_rlgn(JKL) = R_Cath	SIM-A

Subject 3

S: The government is parliamentary democracy, it is probably like England or something but I don't know what are the major religions there. I'd say something like Roman Catholic or Protestant, I'll just say Protestant, oh, Anglican, that is what it is.
I: Why Anglican?
S: Because that's the major religion in England. That's what I think that is. Oh, industry, steel, probably not. I don't know enough about exports, I never did well in this class. Now I am going to take a world geography course just so I can do well on this thing. I said Roman Catholic, just because Roman Catholic is highest in terms of numbers in religion besides eastern as far as free countries.

Analysis

LR1
RS1

Gov(Cntry) = parliament_demo<==> Identity(Cntry) = {England_like}	PBK
Gov(JKL) = parliament_demo	PBK
Identity(JKL) = {England_like}	MI

RS2

a. Mjr_rlgn(Eng) = {R_Cath V Protestant,.}	PBK
b. Mjr_rlgn(Eng) = {Protestant}	PBK 2a retracted.
c. Mjr_rlgn(Eng) = {Anglican}	PBK 2b made more precise.
Mjr_rlgn(Eng) = {Anglican, ..}	

RS3

Mjr_rlgn(England) = {Anglican, ..}	RS2
JKL SIM England: CX (Govt_type)	Computed GBK
Mjr_rlgn(JKL) = {Anglican, ..}	SIM-R

LR2
RS1
Mjr_ind(Cntry) = {steel} <==> Identity(Cntry) ≠ England_like PBK
Mjr_ind(JKL) = {steel, ..} GBK

Identity(JKL) ≠ England_like MI

RS2
Govt_type(JKL) = parliament_demo GBK
Govt_type(Cntry) = parliament_demo <==> Free_cntry_outside_east PBK
Mjr_rlgn(Free_cntry_outside_east) = {R_Cath, ..} PBK

Mjr_rlgn(JKL) = {R_Cath, ..} MI

Conclusion:
LR1: Mjr_rlgn(JKL) = {Anglican, ..}
LR2: Mjr_rlgn(JKL) = {R_Cath, ..}

Mjr_rlgn(JKL) = {R_Cath, ..}

Subject 4

S: I am going to answer the religion question the same way because this sounds like one of the British countries except for Ireland.

(Note: The same way refers to the following dialog from Q9)
S: I am going to put Protestant under religion because again this sounds like a fairly high tech country that is enlightened and has a fairly high standard of living. Frequently the Catholic church is stronger in a country with lower literacy.

Analysis

LR1
RS1
Cntry_type 1 db properties {attributes in table} PBK
Identity(Cntry_type 1) = British cntries except Ireland PBK

RS2
JKL db properties {RS1} GBK

JKL SPEC Cntry_type 1 SPEC-A
Identity(JKL) = British cntries except Ireland MI

RS3
Mjr_rlgn(British cntries except Ireland) = {Protestant} Ques. 9
JKL SPEC British cntries except Ireland PBK

Mjr_rlgn(JKL) = {Protestant, ..} SPEC-A

Question 10B:
What are the major religions in Canada?

Subject 5

S: The religions are Catholic, Protestant and also Jewish.

Analysis

LR1
RS1
Mjr_rlgn(Canada) = {R_Cath, Protestant, Jewish} M Recall

Subject 6

Canada I would say mixed. You would have Roman Catholic there, Christian like Protestant being tied more with England.

Analysis

LR1
RS1
Mjr_rlgn(Canada) = {R_Cath} M Recall

LR2
RS1
Mjr_rlgn(England) = {Protestant} PBK
Canada SIM England: CX (Mjr_rlgn) PBK

Mjr_rlgn(Canada) = {Protestant} SIM -A

Conclusion:
LR1: Mjr_rlgn(Canada) = {R_Cath}
LR2: Mjr_rlgn(Canada) = {Protestant}

Mjr_rlgn(Canada) = {R_Cath, Protestant}

Subject 7

Canada Uhm, well, Canada is split between the French sector, as well as English speaking sector, which given those two warring factions and how that conflict rather manifests itself in the language debate. Should there be French, should the official language be French or should it be English. Um, given how language is so closely ties to religion, I imagine that it's probably Protestant versus Catholic, as well. Although that is not an issue that surfaces so much, that's my thought. So it's probably two religions.

Analysis

LR1
RS1
Lang(people(Canada)) = {French, English} M Recall

RS2
Lang(people(Canada)) <==> Mjr_rlgn(people(Canada)) PBK

RS3
Lang(people(Canada)) = {French, } <==>
Mjr_rlgn(people(Canada))={R_Cath,.} PBK
Lang(people(Canada)) = {French,} PBK

Mjr_rlgn(people(Canada)) = {R_Cath, .} MI

RS4
Lang(people(Canada))={English, } <==>
Mjr_rlgn(people(Canada)) = {Protestant, } PBK
Lang(people(Canada)) = {English,} PBK

Mjr_rlgn(people(Canada)) = {Protestant, ..} MI

Conclusion:
RS3: Mjr_rlgn(people(Canada)) = {R_Cath, .}
RS4: Mjr_rlgn(people(Canada)) = {Protestant, ..}

Mjr_rlgns(Canada) = {R_Cath, Protestant}

Subject 8

S: Let's see. Canada. Their major religion would probably be the Anglican Church or Catholicism. The French are pretty-- there is a lot of French Catholics. Let's see. Church of England, something along those lines. Possibly, I don't know. That's the only one I can think of. Maybe the Lutherans, something like that that's close to Catholic.

Analysis

LR1
RS1
Mjr_rlgn(Cntry} <==> Mjr_rlgn(National_origin(people(Cntry))} PBK
National_origin(people(Canada)) = {France, England} PBK

Mjr_rlgn(Canada) <==> Mjr_rlgn(France, England) MI

RS2
Mjr_rlgn(Canada) <==> Mjr_rlgn(France, England) RS1
Mjr_rlgn(France) = {R_Cath} PBK
Mjr_rlgn(England) = {Church of England} PBK

Mjr_rlgn(Canada) = {R_Cath, Church of England} MI

Question 11A:
Who are the trading partners for ABC (Afghanistan)?

Subject 1

Communist. Press we don't know. Very low, agriculture, rural, trading partners, textiles, very low, hostile. So it could be Russia so they wouldn't trade with themselves. They might trade with Japan or China. Let' see. Well, I don't know. I don't know the relations with Russia so I guess maybe Russia. If they're not Russia, Japan or China.

Analysis

LR1
RS1
Cntry_type 1 db properties {Govt_type(Cntry) = cmnst &
Lit_rate(Cntry) = V.low & Wrk_frc(Cntry) = {agric, ..} &
Mjr_rlgn(Cntry) = {Moslem, ..} & Mjr_ind(Cntry) = textiles &
PCI(Cntry) V.low} PBK
Identity(Cntry_type 1) = {Russia V ..} PBK

Identity(ABC) = {Russia V ..} MI

RS2
ABC db properties {RS1} GBK

ABC SPEC Cntry_type 1 SPEC-A
Identity(ABC) = {Russia V ..} MI

LR2
RS1
Trad_prtnr(Cntry) ≠ {Cntry, ..} PBK

Trad_prtnr(ABC) ≠ {Russia, ..} SPEC-A

RS2
Trad_prtnr(Cntry) ≠ {Russia, ..} <==>
Trad_prtnr(Cntry) = {Cntry_other_than_Russia} PBK
Japan, China SPEC Cntry_other_than_Russia SPEC-A
Trad_prtnr(ABC) ≠ {Russia, ..} RS1

Trad_prtnr(ABC) = {Japan, China} Alternative

Conclusion:
LR1: Identity(ABC) = {Russia V ..}
LR2: Trad_prtnr(ABC) = {Japan, China}

Trad_prtnr(ABC) = {Russia V Japan V China}

Subject_2

S: We'd go with USSR, Czech, and Germans (looking at country EFG)
I: So you are looking at country EFG to derive ABC?
S: Right.

Analysis

LR1
RS1

Trad_prtnr(EFG) = {USSR, Czech, Germany}	GBK
ABC SIM EFG: CX (attributes in table)	Computed-GBK
Trad_prtnr(ABC) = {USSR, Czech, Germany}	SIM- A

Subject_3

This is some Eastern country but I don't know the map very well. Let me look down here. USA, W. Germ., & Israel, they are a Moslem country and they trade with the USA. I'd say non-USA, Eastern.

Analysis

LR1
RS1

Location(Cntry) = East <==> Trad_prtnr(Cntry) ≠ {USA, ..}	PBK
Location(Cntry) = East <==> Trad_prtnr(Cntry) = {Non_USA, Eastern Cntries}	PBK
Location(ABC) = East	Unfounded
Trad_prtnr(ABC) ≠ {USA, ..}.	MI
Trad_prtnr(ABC) = {Non_USA, Eastern Cntries..}	MI

Comment:
This person accidentally answered this question again later in the protocol. The analysis of the second answer follows:

S: Trading partners would be non-USA but I don't know who. It would be non_US because relations are hostile also because religions are Shiite Moslem and government is communist.

Analysis

LR1
RS1

Rltnshp(USA, Cntry)= hostile<==>Trad_prtnr(Cntry) = Non_USA	PBK
Rltnshp(USA, ABC)= hostile	GBK
Trad_prtnr(ABC) = Non_USA	MI

RS2

Mjr_rlgn(Cntry) = Moslem <==> Trad_prtnr(Cntry) = Non_USA	PBK
Mjr_rlgn(ABC) = Moslem	GBK
Trad_prtnr(ABC) = Non_USA	MI

RS3
Gov(Cntry) = cmnst <==> Trad_prtnr(Cntry) = Non_USA PBK
Gov(ABC) = cmnst GBK

Trad_prtnr(ABC) = Non_USA MI

Conclusion:
Trad_prtnr(ABC) = Non_USA RS1, RS2, RS3

Subject 4

I'm putting Russia. Again because at least traditionally, communist countries have traded with other communist countries.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst<==>Trad_prtnr(Cntry)=other_cmnst_cntries PBK
Govt_type(ABC) = cmnst GBK

Trad_prtnr(ABC) = other_cmnst_cntries MI

RS2
USSR SPEC cmnst cntry PBK

Trad_prtnr(ABC) = USSR SPEC-R

Question 11B:
Who are the trading partners for Afghanistan?

Subject 5

The trading partners for Afghanistan, the only one I know for sure is USSR.

Analysis

LR1
RS1
Trad_prtnr(Afghanistan) = USSR M Recall

Subject 6

It would have to be communistic countries because it is communist, say with Soviet Union.

Analysis

LR1

RS1

Govt_type(Cntry) = cmnst <==>
Trad_prtnr(Cntry) = other_cmnst_cntries — PBK
Govt_type(Afghanistan) = cmnst — GBK

Trad_prtnr(Afghanistan) = other_cmnst_cntries — MI

RS2

USSR SPEC other_cmnst_cntry — PBK

Trad_prtnr(Afghanistan) = USSR — MI

Subject 7

Trading partners, again, because the country is at war- war by its very nature totally destroys the infrastructure of a country. Trading, that's the luxury of a wealthy, generally a wealthy or at least a thriving or growing country. War, uh, forces a country to turn in upon itself and only do the very vital, keeping its populace alive. You know, people can grow a vegetable garden in the backyard. So for trading partners probably nothing at official level, beyond what happens between enterprising people who live on border, Afghanistan and Pakistan. Besides weapons, I'm sure there are enterprising people who are trucking food across and back and forth.

Analysis

LR1

RS1

Mil_status(Cntry) = at war <==> Priority(Cntry) = basics — PBK
Mil_status(Afghanistan) = at war — PBK

Priority(Afghanistan) = basics — MI

RS2

Priority(Cntry) = basics <==>
Prod_traded(Cntry) = only_basics — PBK
Priority(Afghanistan) = basics — RS1

Prod_traded(Afghanistan) = only_basics — MI

RS3

Prod_traded(Cntry) = only_basics <==>
Trad_prtnr(Cntry) = no official trad_prtnr — PBK
Prod_traded(Afghanistan) = only_basics — RS2

Trad_prtnr(Afghanistan) = no official trad_prtnr — MI

LR2
RS1
Prod_traded(Cntry) = luxury <==>
Trad_prtnr(Cntry) = {official trad_prtnr) PBK
Trading SPEC Luxury SPEC-R
Prod_traded(Afghanistan) ≠ luxury PBK

Trad_prtnr(Afghanistan) = {no official trad_prtnr) MI

LR3
RS1
{Weapons, food} SPEC only_basics PBK

Prod_traded(Afghanistan) = {weapons, food) SPEC-R

RS2
Prod_traded(Cntry) = {weapons, food} <==>
Trad_prtnrs(Cntry) = bordering_cntries PBK
Prod_traded(Afghanistan) = {weapons, food} PBK

Trad_prtnr(Afghanistan) = bordering_countries MI

Conclusion:
LR1: Trad_prtnr(Afghanistan) = no official trad_prtnr
LR2: Trad_prtnr(Afghanistan) = {no official trad_prtnr)
LR3: Trad_prtnr(Afghanistan) = bordering_countries

Trad_prtnr(Afghanistan) = bordering_countries

Subject 8

S: Uh, trading partners for Afghanistan? Let's see. Uh, I think the USA would be a trading partner seeing as we are on their side. Wait a minute..
I: What'd you say about Afghanistan?
S: Afghanistan's trading partner. I would think even though they're a communist country I know USA was involved in their war against or their confrontation against the Soviets. So I would say the USA would be a trading partner. I'm not sure about any of the others. Possibly somebody like the other countries in the area.

Analysis

LR1
RS1
US_involvement(Cntry) = yes <==> Trad_prtnr(Cntry) = {USA, ..} PBK
US_involvement(Afghanistan) = yes PBK

Trad_prtnr(Cntry) = {USA, ..} MI

LR2
RS1
Trad_prtnr(Cntry) = bordering_cntries(Cntry) PBK
Afghanistan SPEC Cntry PBK

Trad_prtnr(Afghanistan) = bordering_cntries(Afghanistan) SPEC-A

Conclusion:
LR1: Trad_prtnr(Cntry) = {USA, ..}
LR2: Trad_prtnr(Afghanistan) = bordering_cntries(Afghanistan)

Trad_prtnr(Afghanistan) = {USA, bordering_cntries, ..}

Question 12A:
Who are the trading partners of MNO (Cuba)?

Subject_1
MNO. Industry, services, Roman Catholic, none. Communistic country and Roman Catholic. That is strange. Trading partners. Industry, textile, wood, low and hostile. But I wouldn't say they trade with us. I don't think, well, they might trade with us a little bit so it's a hostile relationship.

Oh, let's see. Maybe Japan but I doubt it. Communist countries- who do they trade with? Uh, can't think of any communist countries except for Russia. Oh, China. They could trade, well I don't know if China trades. We don't have China anywhere else (in the matrix). Maybe but I don't know.

Analysis

LR1
RS1
Cntry_type 1 db properties {Mjr_ind = {textiles, wood} &
PCI= low & Rltnshp(USA,Cntry) = hostile} PBK
Trad_prtnr(Cntry_type 1) = maybe a little bit with USA PBK

RS2
MNO db properties {RS1}

MNO SPEC Cntry_type 1 SPEC-A
Trad_prtnr(MNO) = maybe a little bit with USA MI

LR2
RS1
Govt_type(Cntry) = cmnst <==> Trad_prtnr(Cntry) {cmnst cntries, ..} PBK
Govt_type(MNO) = cmnst GBK

Trad_prtnr(MNO) = {cmnst cntries, ..} MI

RS2
Trad_prtnr(MNO) = {cmnst_cntries, ..} RS3
{USSR, China} SPEC cmnst_cntries PBK

Trad_prtnr(MNO) = {USSR, maybe China} MI

Conclusion:
LR1:Trad_prtnr(MNO) = maybe a little bit with USA
LR2:Trad_prtnr(MNO) = {USSR, maybe China}

Trad_prtnr(MNO) = {maybe a little bit with USA,USSR, maybe China}*

Comments:
* Subject is very uncertain about the conclusion.

Subject 2

S: . Govt_type of MNO is communist .. Trading partners would be USSR, Czech, and Germans. Not too much with USA. Textiles and wood products, yeah that sounds like communists.
I: So you got that from EFG?
S: Yeah, I used formula EFG squared. (laughs)

Analysis:

LR1
RS1

Govt_type(Cntry) = cmnst <==> Trad_prtnr(Cntry)={USSR, Czechoslovakia, Germ}	PBK
Govt_type(MNO) = cmnst	GBK

Trad_prtnr(MNO) = {USSR, Czechoslovakia, Germ}	MI
Trad_prtnr(MNO) ≠ USA	MI

LR2
RS1

MNO SIM EFG: CX (Mjr_ind)	Computed-GBK
CX <==> Trad_Pntnr	PBK
Trad_prtnr(EFG) = {USSR, Czechoslovakia, Germ}	GBK

Trad_prtnr(MNO) = {USSR, Czechoslovakia, Germ}	SIM-A

Conclusion:
LR1:Trad_prtnr(MNO) = {USSR, Czechoslovakia, Germ}
Trad_prtnr(MNO) ≠ USA
LR2:Trad_prtnr(MNO) = {USSR, Czechoslovakia, Germ, ≠ USA}

Trad_prtnr(MNO) = {USSR, Czechoslovakia, Germ, ≠ USA}

Subject 3

Type of government is communist, the type of press is state, industry and services produce textile. Trading partners are probably, oh, textiles, wood products. Trading partners are probably non-USA because it is a communist country.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Trad_prtnr(Cntry) ≠ USA — PBK
Govt_type(MNO) = cmnst — GBK

Trad_prtnr(MNO) ≠ USA — MI

Subject 4

I will put Poland because Poland is another communist country.

Analysis

LR1
RS1
Govt_type(Cntry)= cmnst <==> Trad_prtnr(Cntry) = cmnst — PBK
Govt_type(MNO)= cmnst — GBK

Trad_prtnr(MNO) = cmnst — MI

RS2
Trad_prtnr(MNO) = cmnst — RS1
Poland SPEC cmnst_cntry — PBK

Trad_prtnr(MNO) = Poland — MI

Question 12B:
Who are the trading partners of Cuba?

Subject 5

Trading partners are Soviet Union, E. Germany, Hungary, Bulgaria and Poland

Analysis

LR1
RS1
Trad_prtnr(Cuba) = {USSR, E. Germany, Hungary, Bulgaria, Poland} — M Recall

Subject 6

Cuba. Once again, USSR, possibly Czeches because of communists being there.

Analysis

LR1
RS1
Gov(Cntry) = cmnst <==>Trad_prtnr(Cntry) = cmnst_cntries — PBK
Gov(Cuba) = cmnst — GBK

Trad_prtnr(Cuba) = cmnst_cntries — MI

RS2
Trad_prtnr(Cuba) = cmnst_cntries — RS1
USSR, Czech SPEC cmnst_cntries — PBK

Trad_prtnr(Cuba) = {USSR, Czech,..} — SPEC-R

Subject 7

Uh, trading partners, well any of the Soviet block countries or Soviet Satellites.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==>
Trad_prtnr(Cntry) = {Soviet satellite, Soviet_block_cntries,..) — PBK
Govt_type(MNO) = cmnst — GBK

Trad_prtnr(Cuba) = {Soviet satellite, Soviet_block_cntries,..) — MI

Subject 8

Trading partners? Well definitely not the United States. I don't know exactly who they trade with. I know they receive a little money from Russia. Um. Trading partners. I would say some of the other communist block countries.

Analysis

LR1
RS1
Trad_prtnr(Cuba) ≠ USA — M Recall

LR2
RS1
Rltnshp(USSR,Cntry) = receives money <==> Trad_prtnr(Cntry) = USSR — PBK
Rltnshp(USSR,Cuba) = receives money — PBK

Trad_prtnr(Cuba) = USSR — MI

RS2
cmnst_block_countries GEN USSR

Trad_prtnr(Cuba) = {cmnst_block_countries} — GEN-R

Conclusion:
LR1: Trad_prtnr(Cuba) ≠ USA
LR2: Trad_prtnr(Cuba) = {cmnst_block_countries}

Trad_prtnr(Cuba) = {cmnst_block_countries}

Question 13A:
What is the major industry of PQR (Egypt)?

Subject 1
S: Major industry. Agricultural services. Maybe chemicals for PQR. Maybe chemicals for major industry.
I: How come?
S: I don't know. 'cause I'm looking here. 'Cause I'm looking at GHI and they have agriculture, industry and they have steel, autos and chemicals for major industry so then at PQR...

Analysis

LR1
RS1
Mjr_ind(GHI) = {steel, autos, chemicals} <==> Wrk_frc(GHI) = {industry, agric, serv, ..} GBK

Mjr_ind(Cntry) = {steel, autos} <==> Wrk_frc(Cntry) = {industry} PBK
Mjr_ind(Cntry) = {chem} <==> Wrk_frc(Cntry) = {agric, serv} PBK

RS2
PQR SIM GHI: CX(Wrk_frc: services, agriculture) GBK
PQR DIS GHI: CX(Wrk_frc: industry) GBK

Mjr_ind(PQR) = {chemical} RS1

Subject 2

S: PQR. democratic republic, mixed media, agricultural services (sic), major industry, hm, USA. West Germany. Would be steel, and um, steel.
I: I'm gonna have to ask you why.
S: Well, because I'm thinking about the major things that those countries would use, and that would be steel.
I: OK.
S: Relations is normal with the United States.

Analysis

LR1
RS1
Trad_prtnr(Cntry) = {Y,..} & Use(Y) = {X,..} <==> Mjr_ind(Cntry) = {X,..} PBK
Trad_prtnr(PQR) = {USA, W. Germ..} GBK
Use({USA, W.Germ}) = {steel, ..} PBK

Mjr_ind(PQR) = steel MI

Subject 3

Not answered

Subject 4

I am going to put cotton. The characteristics here sort of suggest an African or Mediterranean country.

Analysis

RS1
Cntry_type 1 db properties {attributes in table} PBK
Identity (Cntry_type 1) = {African, Mediterranean} PBK

RS2
PQR db properties {RS1} GBK

PQR SPEC Cntry_type 1 SPEC-A
Identity(Cntry) = {African, Mediterranean} MI

RS3
Identity(Cntry) = {African, Mediterranean}<==>Mjr_ind(Cntry)= cotton PBK
Identity(PQR) = {African, Mediterranean} RS1

Mjr_ind(PQR) = cotton MI

Question 13B:
What is the major industry of Egypt?

Subject 5

S: The industry in Egypt. That is a good question. They produce weapons I know that for sure. Not as many as Israel but they do produce weapons, some agriculture and it is also textiles.

Analysis

LR1
RS1
Mjr_ind(Egypt) = {weapons, agriculture, textiles} M Recall

Subject 6

I would say some type of cotton goods. I think of them more associated with petrochemicals because of where they are.

Analysis

LR1
RS1
Mjr_ind(Egypt) = cotton goods M Recall

RS2

Location(Cntry) = Middle East <==> Mjr_ind(Cntry) = {petrochemical,..}	PBK
Egypt SPEC Location(Cntry) = Middle East	SPEC-A
Mjr_ind(Egypt) = {petrochemicals,..}	MI

Subject 7

Egypt's major industry. Uhm. I think historically Egypt has been an agricultural society. But, yeah, it's primary work force is either agriculture or services. I think it's somewhat in transition. Knowing that they can't rely forever on agriculture exports, they are trying to move into service industry. Trying to modernize a country is a monumental task, but that's what I think.

Analysis

LR1

RS1

Mjr_ind(Egypt, past) = {agric,..}	PBK
Wrk_frc(Egypt, now) = {agric, service..}	GBK
Wrk_frc(cntry, time) <==> Mjr_ind(cntry, time)	PBK
Mjr_ind(Egypt, now) = {agric, service,..}	MI

LR2

RS1

~Can_rely(cntry, agric) <==> Nd_to_chng(Mjr_ind(cntry), agric, service)	PBK
Mjr_ind(Egypt, past) = {agric, ..}	PBK
Egypt SPEC cntry	SPEC-A
Nd_to_chng(Mjr_ind(Egypt), agric, service)	MI

RS2

Eq C: {service_ind, modern_ind}	PBK
Diff(Chng(agric, modern_ind)) = high	PBK
Mjr_ind(Egypt, past) = agric	PBK
Mjr_ind(Egypt, now) = ~service	MI

RS3

Nd_to_Chng(A,B,C) & Sup(LRi,C) & Sup(LRj,~C) <==> Trans(A,B,C)	PBK
Sup(RS1, service) & Sup(RS3, ~service)	RS2 & RS3
Nd_to_chng(Mjr_ind(Egypt), agric, service)	RS2
Trans(Mjr_ind(Egypt), agric, service)	MI

Conclusion:

LR1: Mjr_ind(Egypt, now) = {agric, service,..}
LR2: Trans(Mjr_ind(Egypt), agric, service)

Mjr_ind(Egypt, now) = {agric, service,..}

Subject 8

Let's see. Egypt's major industry would probably be oil. Agriculture, services they have down here as workforce. I can't think what else Egypt possibly would produce other than oil and maybe textiles.

Analysis

LR1
RS1
Mjr_ind(Egypt) = oil — M Recall

LR2
RS1
Wrk_frc(Cntry) = {agric, srvics} <==> Mjr_ind(Cntry) = {oil, some txtiles} — PBK
Wrk_frc(Egypt) = {agriculture, services} — GBK

Mjr_ind(Egypt) = {oil, some textiles} — MI

Conclusion:
LR1: Mjr_ind(Egypt) = oil
LR2: Mjr_ind(Egypt) = {oil, some textiles}

Mjr_ind(Egypt) = {oil, some textiles}

Question 14A:
What is the major industry in STU (Iran)?

Subject 1

S: STU. State. medium, agriculture. West Germany, Japan, Italy, low, hostile. Low, agricultural, industrial, STU. West Germany, Japan, Italy. Hm. Well, I don't know about that one. Agricultural, industrial. Maybe steel for STU.
I: Maybe steel?
S: Yeah.
I: Why is that?
S: I am trying to draw connections here so because of agriculture and industrial (pointing to country DEF) we have cotton goods, fishmeal, alcohol. Hm. Okay. I guess I'll stick with steel.
I: For STU?
S: Yeah. I'm probably getting all these wrong but I'm trying, okay.

Analysis

LR1
RS1
STU DIS DEF: CX (Wrk_frc) — GBK
Wrk_frc <==> Mjr_ind — PBK
Mjr_ind(DEF) = {cotton goods, fishmeal, alcohol} — GBK

Mjr_ind(STU) ≠ {cotton goods, fishmeal, alcohol} — DIS-A

RS2
Mjr_ind(STU) ≠ {cotton goods, fishmeal, alcohol} RS1
{cotton goods, fishmeal, alcohol} DIS steel PBK

Mjr_ind(STU) = steel DIS-R

Subject 2

S: Theocracy. I don't know what a theocracy is.
I: A theocracy is when the government is run by religious means. I guess. I don't know how to describe it.
S: Then you don't understand it yourself.
I: Well, I do understand it.
S: Is there a reason why you don't understand it? (laughs)
I: Um, I have a hard time with definitions.
S: West Germany, Japan, Italy. Major industry would be fishmeal and shipbuilding. Got that one right. And I'm gonna have to ask why. (laughs). And the reason being, West Germany, Italy, agricultural industries. I don't know what is the explanation.
I: But you just feel like that's the answer?
S; Yeah, that's the answer.
I: OK

Analysis

LR1
RS1
Trad_prtnr(STU) = {W. Germany, Italy} GBK
Wrk_frc(STU) = {agric industries} GBK

Mjr_ind(STU) = {fishmeal, shipbuilding} *

Comment:
*Subject does not connect tabled information to conclusion, no information is explicitly used to make inference.

Subject 3

The labor force is agricultural, therefore the major industries might be food because of the agriculture, textiles maybe because of the industry. It wouldn't be anything like steel because they don't have raw materials like that over there.

Analysis

LR1
RS1
Wrk_frc(Cntry) = agric <==> Mjr_ind(Cntry) = {food} PBK
Wrk_frc(STU) = agric GBK

Mjr_ind(STU) = {food} MI

LR2
RS1
Wrk_frc(Cntry) = {industry} <==> Mjr_ind(Cntry) = {steel, textiles} PBK
Wrk_frc(STU) = {industry} GBK

Mjr_ind(STU) = {steel, textiles} MI

RS2
Raw_mat(Cntry) = no <==> Mjr_ind ≠ steel PBK
Raw_mat(STU) = no PBK

Mjr_ind(STU) ≠ steel MI

Conclusion:
LR1: Mjr_ind(STU) = {food}
LR2: Mjr_ind(STU) = {steel, textiles}
LR2: Mjr_ind(STU) ≠ steel

Mjr_ind(STU) = {food, textiles}

Subject 4

Government theocracy. I am going to put Nepal, no I don't want to do that. I am going to put tourism. I don't think this country has much else going for it except beautiful scenery and mountains.

Analysis

LR1
RS1
Govt_type(Cntry) = theocracy <==> Identity(Cntry) = Nepal PBK
Govt_type(STU) = theocracy GBK

Identity(STU) = Nepal MI

RS2
Chrctrstcs(Cntry) = {beautiful scenery,..}<==>Mjr_ind(Cntry) = tourism PBK
Chrctrstcs(Nepal) = {beautiful scenery, mountains} PBK
Identity(STU) = Nepal RS1

Mjr_ind(STU) = tourism MI

Question 14B:
What is the major industry in Iran?

Subject 5

The industry is also weapons but not very many at this point. Also some agriculture and textiles.

Analysis

LR1
RS1
Mjr_ind(Iran) = {weapons(~many), some agriculture, textiles} M Recall

Subject 6

Chemicals for Iran, once again. My logic for that is the association with Middle Eastern countries and the amount of revenue there from the petrochemicals.

Analysis

LR1
RS1
Location(Cntry) = Middle East <==> Mjr_ind(Cntry) = {petrochemical, ..} PBK
Iran SPEC Middle Eastern cntry PBK

Mjr_ind(Iran) = {petro_chemical, ..} SPEC-R

RS2
Mjr_ind(Iran) = {petro_chemical, ..} RS1
Chemicals GEN petro_chemicals PBK

Mjr_ind(Iran) = chemicals GEN-R

Subject 7

Iran. Major industries. You know, I have no idea. When we stopped, when we closed diplomatic relations with Iran uh, in when were the hostages taken? 81? 80? Um, our press was naturally very limited. What appears in our press, if at all, photographs from Iran are from foreign press. We know so very little, and what we see is always these, they're just crazy, these crazy Moslems. Let me put it this way, we only see or hear about radical fundamentalists. Um, again, I imagine Iran has been historically an agricultural based society. Uh, however, to finance his revolution and got to imagine his, Khomeini's, war with Iraq, he's been forced to industrialize to a point. Now that the war has ended with Iraq they'll probably be able to convert those weapons, those material factories into more consumer goods.

Analysis

LR1
RS1
Mjr_ind(Iran,past) = agric M Recall

LR2
RS1
Mil_status(Cntry) = at war <==> Mjr_ind(Cntry) = weapons PBK
Mil_status(Iran,past) = at war PBK

Mjr_ind(Iran,past) = weapons MI

RS2
Mjr_ind(Cntry,past) = weapons <==>
Mjr_ind(Cntry,now) = {more consumer goods, ..} PBK
Mjr_ind(Iran,past) = weapons RS2

Mjr_ind(Iran,now) = {more consumer goods, ..} MI

Conclusion:
LR1: Mjr_ind(Iran,past) = agric
LR2: Mjr_ind(Iran,now) = {more consumer goods, ..}

Mjr_ind(Iran) = {moving from weapons to consumer goods, ..}

Subject 8
S: Um, Let's see. Iran for the same thing(Industry). Iran produces pistachio nuts (laughs).
I: No. (laughs)
S: Yes, they do. I know they do. They have an agricultural industry. Yeah, they produce pistachio nuts and olives and things like that. I would say they produce agricultural products and things like oil. That's the big one with them because we've been boycotting their oil. We hadn't been buying it anyway.

Analysis

LR1
RS1
Mjr_ind(Iran) = {pistachio_nuts, olives,..} M Recall

RS2
Agric GEN pistachio_nuts PBK

Mjr_ind(Iran) = {agricultural industry, ..} GEN-R

LR2
RS1
Boycott(USA, Cntry) <==> Mjr_ind(Cntry) = oil PBK
Boycott(USA, Iranian_oil) PBK

Mjr_ind(Iran) = oil MI

Conclusion:
LR1: Mjr_ind(Iran) = oil
LR2: Mjr_ind(Iran) = {agricultural industry, ..}

Mjr_ind(Iran) = {agricultural industry, oil,..}

Question 15A:
What is the per capita income for DEF (Angola)?

Subject_1

S: Per capita income I would say is low for DEF.
I: So you are working there.
S: Right, for DEF.
I Why do you say that?
S: Good question. Um. Because well medium low literacy rate. Actually it might, it's trading with us though. That's good. State press, it's not a totally free country. I don't think it is communist, but I don't think it is totally free, like the United States. So I'd say low to medium per capita.

Analysis

LR1
RS1
Lit_rate(Cntry) = med_low <==> PCI(Cntry) = low — PBK
Lit_rate(DEF) = med_low — GBK

PCI(DEF) = low — MI

LR2
RS1
Trad_prtnr(Cntry) = USA <==> Rltnshp(USA,Cntry) = good — PBK
Trad_prtnr(DEF) = USA — GBK

Rltnshp(USA,DEF) = good — MI

RS2
Rltnshp(USA,Cntry) = good <==> PCI(Cntry) = high — PBK
Rltnshp(USA,Cntry) = good — RS1

PCI(DEF) = high — MI

LR3
RS1
Press_type(Cntry) = state <==> Pol_sys(Cntry) ≠ free — PBK
Press_type(DEF) = state — GBK

Pol_sys(Cntry) ≠ free — MI

RS2
Pol_sys(Cntry) ≠ free <==> PCI(Cntry) = low_to_med — PBK
Pol_sys(DEF) ≠ free — RS1

PCI(DEF) = low_to_med — MI

Conclusion:
PCI(DEF) = low
PCI(DEF) = high
PCI(DEF) = low_to_med

PCI(DEF) = low_to_med

Subject 2
Not answered

Subject 3

Cotton goods. fishmeal, alcohol, relations strained, per capita income, the labor force is agricultural, their income is probably low. Their labor force is largely agricultural so their income is probably not real high because agriculture does not generate a lot of income.

Analysis

LR1
RS1
Cntry_type 1 db properties {Mjr_ind = cotton_good, fishmeal,
alcohol, Rltnshp(USA,Cntry) = strained, Wrk_frc(Cntry) = agric} PBK
PCI(Cntry_type 1) = low PBK

RS2
DEF db properties {RS1} GBK

DEF SPEC Cntry_type 1 SPEC-A
PCI(DEF) = low MI

LR2
RS1
Wrk_frc(Cntry) = agric <==> PCI(Cntry) = low PBK
Wrk_frc(DEF) = agric RS1a

PCI(DEF) = low MI

Conclusion:
LR1: PCI(DEF) = low
LR2: PCI(DEF) = low

PCI(DEF) = low

Subject 4

Type of government republic. I guess because of the combination of medium low literacy rate and Roman Catholic and cotton goods makes me think of Egypt or some Mediterranean country. For the same reason, the per capita income is low.

Analysis

LR1
RS1
Lit_rate(Cntry) = med_low &
Mjr_rlgn(Cntry) = R_Cath &
Mjr_ind(Cntry) = {cotton_goods, .. } <==>
  Identity(Cntry) ={Egypt V Mediterranean} PBK
Lit_rate(DEF) = med_low GBK
Mjr_rlgn(DEF) = R_Cath GBK
Mjr_ind(DEF) = cotton_goods GBK

Identity(DEF) ={Egypt V Mediterranean_cntry} MI

RS2
PCI(Egypt V Mediterranean_cntry) = low PBK
DEF SIM {Egypt V Mediterranean_cntry}: CX (Lit_rate, Mjr_rlgn
  Mjr_ind) RS1
CX <==> PCI PBK

PCI(DEF) = low MI

Question 15B:
What is the per capita income for Angola?

Subject_5

The per capita income is very low.

Analysis

LR1
RS1
PCI(Angola) = very low M Recall

Subject_6

I would say low to medium because the work force is primarily agricultural and because it is communistic country.

Analysis

LR1
RS1
Wrk_frc(Cntry) = agric <==> PCI(Cntry) = low_to_med PBK
Wrk_frc(Angola) = agric GBK

PCI(Angola) = low_to_med MI

RS2
Govt_type(Cntry) = cmnst <==> PCI(Cntry) = low_to_med PBK
Govt_type(Angola) = cmnst GBK

PCI(Angola) = low_to_med MI

Subject 7

S: Per capita income- again I based my reasoning would be because there's the ongoing civil war and given the fact that it's located in Africa, which kind of precludes any. Africa does not have a wealthy nation with the possible exception of South Africa, which is of course undergoing great stresses and strains. Um, I imagine its per capita income is very low.

Analysis

LR1
RS1
Mil_status(Cntry) = at war <==> PCI(Cntry) = low PBK
Mil_status(Angola) = at war PBK

PCI(Angola) = low MI

LR2
RS1
PCI(African cntries except South Africa) = low PBK
Angola SPEC African cntry except South Africa PBK

PCI(Angola) = low MI

Conclusion:
LR1: PCI(Angola) = low
LR2: PCI(Angola) = low

PCI(Angola) = very low

Subject 8

Um, let's see. Per capita income of Angola. Oh geez I bet that's pretty low. You've got, yeah, it's an agricultural society with medium low literacy rate, state run press, Roman Catholics. Yes, I would say that they're pretty low in income level.

Analysis

LR1
RS1
Cntry_type 1 db propeties {Wrk_frc = agric, Lit_rate = med_low,
Press_type = state, Mjr_rlgn = R_Cath} PBK
PCI(Cntry_type 1) = low PBK

RS2
Angola db properties {RS1} GBK

Angola SPEC Cntry_type 1 SPEC-A
PCI(Angola) = low MI

Question 16A:
What is the relationship between GHI (Brazil) and the USA?

Subject 1
GHI. Republic, private press, medium high literacy rate, services, agriculture, industry. Major religions. United States, Japan. Steel, autos, chemicals. Low. Relationship with United States. OK. I'd say normal for GHI, the relationship with the United States.

Analysis

LR1
RS1
Cntry_type 1 db properties {Govt_type = republic, Press_type = private press, Lit_rate = med_high, Wrk_frc = service, agric, industry, Trad_prtnr = USA, Japan, Mjr_ind = steel, autos, chemicals} PBK
Rltnshp(USA,Cntry_type 1) = normal PBK

RS2
GHI db properties {RS1} Computed-GBK

GHI SPEC Cntry_type 1 SPEC-A
Rltnshp(USA,GHI) = normal MI

Subject 2
S: Relations with USA? These guy's got a good Conclusion: with the USA.
I: How come?
S: Well because their major industry is what USA likes.

Analysis

LR1
RS1
Mjr_ind(Cntry) = X &
Likes(USA, X) = true <==> Rltnshp(Cntry, USA) = good PBK
Likes(USA, { steel, autos, chemicals}) = true PBK
Mjr_ind(GHI) = {steel, autos, chemicals} GBK

Rltnshp(GHI, USA) = good MI

Subject 3
S: Trading partners are USA, industries are steel, autos, chemicals, relations with the USA are probably very good since they are one of the trading partners oh, normal is the standard deal you say.

Analysis

LR1
RS1
Trad_prtnr(Cntry) = {USA, ... } <==> Rltnshp(Cntry, USA) = good PBK
Trad_prtnr(GHI) = {USA, ... } GBK

Rltnshp(Cntry, USA) = good MI

Subject 4

S: I am going to put Protestant under religion because again this sounds like a fairly high tech country that is enlightened and has a fairly high standard of living. Frequently the Catholic church is stronger in a country with lower literacy. (Answer to question 9 but used in this answer as a reference).

S: I am going to put very good. Again, I think, traditionally our relationship with countries like that have been very good.

Analysis

LR1
RS1
Cntry_type (Cntry) = high tech db properties {attributes in the table for GHI} PBK

RS2
GHI db properties {RS1} Computed-GBK

GHI SPEC Cntry_type 1 SPEC-A
Cntry_type(GHI) = high tech MI

RS3
Cntry_type(Cntry) = high tech <==> Rltnshp(USA, Cntry) = good PBK
Cntry_type(GHI) = high tech RS2

Rltnshp(USA, Cntry) = good MI

Question 16B:
What is the relationship between Brazil and the USA?

The relations are very good.

Analysis

LR1
RS1
Rltnshp(Brazil, USA) = very_good M Recall

Subject 6

Let's say normal. I am not that aware of conflicts with Brazil and because of trading partners with the USA and because they are a democratic republic just as the USA is.

Analysis

LR1

RS1

Conflicts(Cntry, USA) = no <==> Rltnshp(Cntry, USA) = good — PBK
Conflicts(Brazil, USA)= no — GBK

Rltnshp(Brazil, USA) = good — MI

LR2

RS1

Trad_prtnr(Cntry) = USA <==> Rltnshp(Cntry) = good — PBK
Trad_prtnr(Brazil,) = {USA, ..} — GBK

Rltnshp(Brazil, USA) = good — MI

LR3

RS1

Govt_type(Cntry) SIM Govt_type(USA) <==> Rltnshp(Cntry, USA) = good — PBK
Govt_type(Brazil) = democratic_republic — GBK
Brazil SIM USA in CX(govt) — GBK

Rltnshp(Brazil, USA) = good — MI

Conclusion:

LR1: Rltnshp(Brazil, USA) = good
LR2: Rltnshp(Brazil, USA) = good
LR3: Rltnshp(Brazil, USA) = good

Rltnshp(Brazil, USA) = good

Subject 7

Relations with USA? Um, like many Latin American countries they carry on. I can't help but be partly state department and partly on my own. It is somewhat an adolescent relationship in that while they need us they hate themselves for needing us. They're terribly, I don't know what ranking they are, well, it doesn't matter, they are terribly indebted to us. And they hate that. Anyone hates, they know they owe us money, and we help them a lot, but of course now politically it's very, the repercussions of these actions are politically very unpopular. But you can call, given the different titles here, I think relations are normal.

Analysis

RS1

Needs(Cntry1, Cntry2) = true <==> Hates(Cntry1, Cntry2) = true — PBK
Needs(Latin_America, USA) = true — PBK

Hates(Latin_America, USA) = true — MI

RS2
Indebted(Cntry1, Cntry2) = true <==> Hates(Cntry1, Cntry2) = true PBK
Indebted(Latin_America, USA) = true PBK

Hates(Latin_America, USA) = true MI

RS3
Hates(Cntry1, Cntry2) = true <==> Rltnshp(Cntry1, Cntry2) =
tend_to_be_bad PBK
Hates(USA,Latin_America) = true

Rltnshp(USA,Latin_America) = tend_to_be_bad MI

RS4
Brazil SIM Latin_America: CX (Needs, Indebted) PBK

Rltnshp(Brazil, USA) = tend_to_be_bad MI

RS5
Eq. class: {tend_to_be_bad, normal} Eq. Class

Rltnshp(Brazil, USA) = normal

Subject 8

As far as the relations with the United States, they're OK. They're not great at the moment because we're trying to get them to stop cutting down the rain forest and they owe us an awful lot of money.

Analysis

LR1
RS1
Rltnshp(USA,Brazil,past) = OK M Recall

LR2
RS1
Pressure(Cntry1, Cntry2,now) <==>
Rltnshp(Cntry1, Cntry2,now) = not_normal PBK
Pressure(Brazil, USA,now) = yes PBK

Rltnshp(Brazil, USA,now) = not_normal MI

RS2
Indebted(Cntry1, Cntry2,now) <==>
Rltnshp(Cntry1, Cntry2,now) = not_normal PBK
Indebted(USA,Brazil,now) = yes PBK

Rltnshp(USA,Brazil,now) = not_great MI

Conclusion:
LR1: Rltnshp(USA,Brazil,past) = OK
LR2: Rltnshp(Brazil, USA,now) = not_great

Rltnshp(Brazil, USA,now) = not_great

Question 17A:
What is the relationship between EFG (Poland) and the USA?

Subject 1

S: Communist, mixed, very high literacy rate. Work force we don't know. Roman Catholic, United States. I'd say strained relations with United States because they're Roman Catholic. Not that that has anything to do with that but, I don't think it ... they're communist, though. Ah, I'd go with strained.
I: Strained because they have Roman Catholic.?
S: Yeah, because of Roman Catholic. Logic. I got great logic. (laughs).

Analysis

LR1
RS1

Mjr_rlgn(Cntry) = R_Cath <==> Rltnshp(USA, Cntry)= strained	PBK
Mjr_rlgn(EFG) = R_Cath	GBK

Rltnshp(USA, EFG) = strained	MI

LR2
RS1

Govt_type(Cntry) = cmnst <==> Rltnshp(USA, Cntry) = strained	PBK
Govt_type(EFG) = cmnst	GBK

Rltnshp(USA, EFG) = strained	MI

Conclusion:
LR1: Rltnshp(USA, EFG) = strained
LR2: Rltnshp(USA, EFG) = strained

Rltnshp(USA, EFG) = strained

Subject 2

S: And relations with USA would be normal.
I: Normal?
S: Yeah, because if they have a high literacy rate they'd probably be communicating with the United States.

Analysis

LR1
RS1
Lit_rate(Cntry) = high <==> Comm(USA,Cntry) = normal PBK
Lit_rate(EFG) = high GBK

Comm(USA,EFG) = normal MI

RS2
Comm(USA,Cntry) = normal <==> Rltnshp(USA,Cntry) = normal PBK
Comm(USA,EFG) = normal RS1

Rltnshp(USA,EFG) = normal MI

Subject 3

The government is communist which usually by definition means strained relations. They don't trade with any one we trade with, they're just not our best friends.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(USA, Cntry) = strained PBK
Govt_type(EFG) = cmnst GBK

Rltnshp(USA, EFG) = strained MI

LR2
RS1
Cntry DIS USA: CX(Trad_prtnr) <==> Rltnshp(USA, Cntry) = strained PBK
EFG DIS USA: CX(Trad_prtnr) GBK

Rltnshp(USA, EFG) = strained MI

Conclusion:
LR1: Rltnshp(USA, EFG) = strained
LR2: Rltnshp(USA, EFG) = strained

Rltnshp(USA, EFG) = strained

Subject 4

Since the major trading partners are Russia, E. Germany and Czech I am going to say the relations with the USA are strained.

Analysis

LR1
RS1
Trad_prtnr(Cntry) = {USSR, E. Germany, Czech} <==>
Rltnshp(USA, Cntry) = strained PBK
Trad_prtnr(EFG) = {USSR, E. Germany, Czech} GBK

Rltnshp(USA, EFG) = strained MI

Question 17B:
What is the relationship between Poland and the USA?

Subject 5

Relations with USA are normal.

Analysis

LR1
RS1
Rltnshp(USA,Poland) = normal M Recall

Subject 6

It is communistic, so I would associate that as a strained perhaps, but not necessarily hostile. But because it being communistic and its relations, typically the communistic countries it appears hostile.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(USA, Cntry) = {strained,
appears hostile} PBK
Govt_type(Poland) = cmnst GBK

Rltnshp(USA, Poland) = {strained, appears hostile} MI

Subject 7

Relations with USA? Um, I think we were a new status certainly in the past couple of months when the government has one, lifted martial law, and secondly, and more importantly, recognized solidarity. Things are happening in Poland I know from other, from the media, that are unprecedented, that we never thought could have happened five years ago.

Analysis

LR1
RS1
Events(Cntry) = {gov. lifted martial law and recognized solidarity} <==>
Rltnshp(USA, Cntry) = new status PBK
Events(Poland) = {gov. lifted martial law and recognized solidarity} PBK

Rltnshp(USA, Poland) = new status MI

RS2 (Implicit)
Eq. class {new_status, better_relations} Implicit- Eq. Class
Rltnshp(USA, Poland) = new status RS1

Rltnshp(USA, Poland) = better_relations MI

Subject 8

Um, the relations with the United States are probably not the greatest in the world but they are not terrible either.

Analysis

LR1
RS1
Rltnshp(USA, Poland) = not the greatest, but not terrible M Recall

Question 18A:
What is the relationship between HIJ (Vietnam) and the USA?

Subject 1
S: HIJ. Communist, state, medium high literacy rate. Work force we don't know. Well, they got a mix of religions there. United States, Japan, HongKong, food processing, textiles- very low. Unknown relationship. with United States. Hm, hostile, maybe strained. They trade with Russia, which we probably don't like. (looking at MNO) Communist country. Well, hostile, Roman catholic, that was hostile. Um. Hostile, maybe strained.
I: Why?
S: Because they're a communist country and they trade with Russia, so we might not like that very much. And because their religion.

Analysis

LR1
RS1
Trad_prtnr(Cntry) = USSR <==> Rltnshp(USA, Cntry) = hostile PBK
Trad_prtnr(HIJ) = USSR GBK

Rltnshp(USA, HIJ) = hostile MI

RS2
HIJ SIM MNO: CX(Govt_type, Mjr_rlgn) Computed GBK
Govt_type(Cntry) & Mjr_rlgn(Cntry) <==> Rltnshp(USA, Cntry) PBK
Rltnshp(USA, MNO) = hostile GBK

Rltnshp(USA, HIJ) = hostile SIM-A

Subject 2
HIJ. Communist state, .. and their relations with United States would be somewhat hostile.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(USA, Cntry) = hostile PBK
Govt_type(HIJ) = cmnst GBK

Rltnshp(USA, HIJ) = hostile MI

Subject 3
I'd say strained, the press is state so they have little outside influence that may suggest freedom. I'd say normal to strained on that.

Analysis

LR1
RS1
Press_type(Cntry) = state <==> Pol_sys(Cntry) = {little outside influence, no freedom} PBK
Press_type(HIJ) = state GBK

Pol_sys(HIJ) = {little outside influence, no freedom} MI

RS2
Pol_sys(Cntry) = {little outside influence, no freedom} <==>
Rltnshp(USA, Cntry) = normal to strained PBK
Pol_sys(HIJ) = {little outside influence, no freedom} RS1

Rltnshp(USA, Cntry) = normal to strained MI

Subject 4

I'd say normal. Oh wait a minute, I am going to say strained because I keep going back to this communist state and Russia.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(USA, Cntry) = strained PBK
Govt_type(HIJ) = cmnst GBK

Rltnshp(USA, HIJ) = strained MI

LR2
RS1
Trad_prtnr(Cntry) = {USSR,..} <==> Rltnshp(USA, Cntry) = strained PBK
Trad_prtnr(HIJ) = {USSR,.} GBK

Rltnshp(USA, HIJ) = strained MI

Conclusion:
LR1: Rltnshp(USA, HIJ) = strained
LR2: Rltnshp(USA, HIJ) = strained

Rltnshp(USA, HIJ) = strained

Question 18B:
What is the relationship between Vietnam and the USA?

Subject 5

Relations with USA are strained.

Analysis

LR1
RS1
Rltnshp(USA, Vietnam) = strained M Recall

Subject 6
I would say strained. They are communistic and we still have some problems with our PR and our POWs that are still there and getting them out. We have had some cooperation with them with POWs and getting the bodies out lately.

Analysis

LR1
RS1
Govt_type(Cntry) = cmnst <==> Rltnshp(Cntry, USA) = strained PBK
Govt_type(Vietnam) = cmnst GBK

Rltnshp(Vietnam, USA) = strained MI

LR2
RS1
PR(Cntry, USA) = poor <==> Rltnshp(Cntry, USA) = strained PBK
PR(Cntry, USA) = poor PBK

Rltnshp(Cntry, USA) = strained MI

LR3
RS1
Hold_POWs(Cntry) = true <==> Rltnshp(Cntry, USA) = strained PBK
Hold_POWs(Vietnam) = true PBK

Rltnshp(Cntry, USA) = strained MI

Conclusion:
LR1: Rltnshp(Vietnam, USA) = strained
LR2: Rltnshp(Vietnam, USA) = strained
LR3: Rltnshp(Vietnam, USA) = strained

Rltnshp(Vietnam, USA) = strained

Subject 7

And relations with the USA? Um, it's a communist state, very repressive. Slowly, slowly relations are improving. I just read an article where they are actually trying to promote tourism on some of the Vietnamese beaches, which is surreal almost to anyone who is aware of the Vietnam war. But I think it will depend right now on, it's pending on how Vietnam treats Cambodia, and I should know more about this. But I don't. So that's it.

Analysis

LR1
RS1
Govt_type(Cntry) = {cmnst, very repressive} <==> Rltnshp(USA, Cntry) = poor PBK
Govt_type(Vietnam) = {cmnst, very repressive} PBK

Rltnshp(USA, Vietnam) = poor MI

LR2
RS1
Event(Cntry) = {promoting tourism} <==> Rltnshp(USA, Cntry) = good PBK
Event(Vietnam) = {promoting tourism} PBK

Rltnshp(USA, Vietnam) = good MI

LR3
RS1
Treatment(Cntry, Cambodia) = good <==> Rltnshp(USA, Cntry)= good PBK
Treatment(Cntry, Cambodia) = unknown <==>
Rltnshp(USA, Cntry) = unknown PBK
Treatment(Vietnam, Cambodia) = unknown PBK

Rltnshp(USA, Vietnam) = unknown MI

Conclusion:
LR1: Rltnshp(USA, Vietnam) = poor
LR2: Rltnshp(USA, Vietnam) = good
LR3: Rltnshp(USA, Vietnam) = unknown

Rltnshp(USA,Vietnam) = strained, slowly improving

Subject 8

Um, we don't have relations with them at this point. That was pretty much cutoff a few years ago. They've just started to communicate with them (USA?) now. I wouldn't say hostile but probably strained.

Analysis

LR1

RS1

Comm(USA,Cntry,past) = none <==> Rltnshp(Cntry, USA,past) = strained — PBK

Comm(USA,Vietnam,past) = none, — PBK

Rltnshp(USA,Vietnam,past) = strained — MI

LR2

RS1

Comm(USA,Cntry,now) = normal<==> Rltnshp(USA,Cntry,now) = normal — PBK

Comm(USA,Vietnam,now) = starting_up_again — PBK

Rltnshp(USA,Vietnam,now) = getting better — MI

Conclusion:

LR1: Rltnshp(USA,Vietnam,past) = strained

LR2: Rltnshp(USA,Vietnam,now) = getting better

Rltnshp(Vietnam, USA) = poor but getting better