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Stephen C. Levinson and Asifa Majid

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Contact
Email us via library@mpi.nl
Max Planck Institute for Psycholinguistics
P.O. Box 310, 6500 AH, Nijmegen, The Netherlands

Exploring the Intrinsic Frame of Reference.

Eve Danziger and Suzanne Gaskins, May 1993.

Introduction and Terminology:

In the recent cognitive science literature (Miller and Johnson-Laird 1976, Levelt 1984, Garnham 1989, Carlson-Radvansky and Irwin 1993) it is common to talk about three possible "reference frames" within which a figure can be related to a ground. Multiple reference frames are possible within one language (English, Dutch, German) in this literature so we are not dealing with characterizations of languages but with ways of using languages.

The three cog sci frames are:

extrinsic -- features of the surrounding environment provide reference points for linguistic reference.
deictic -- the viewer/speaker's own perceptions provide the reference point
intrinsic -- features of the Ground object provide the reference point.

Many people in our group have objected to the use of the term "deictic" in the above sense and recently the term "projective" has been substituted. But this is no better because we need this term for making a distinction between part and region within the Topology discussion. It would be best if we could begin using another term altogether. Balthazar has coined the term "egomorphic" for this type of reference frame. His terminology will be used in what follows.

Motivation

Whether or not it uses Absolute (extrinsic) or Egomorphic frames of reference, almost every language in our group makes use of an Intrinsic frame. Every language that uses an Intrinsic frame also uses some other frame. We are interested in:

1. Clarifying the contexts in which the Intrinsic frame is used relative to the other frames that the language may have available. We think there may be strong differences among languages. For example, we think that the "body-part" or "object-oriented" languages of Mesoamerica (and the Pacific?) will use the Intrinsic frame in more contexts than the European languages will.

2. Finding out whether people solve non-linguistic spatial problems using strategies that correspond to their linguistic frames in comparable situations. i.e. If we discover that in some language people use an intrinsic frame for toy objects and an absolute one for real objects, do they also approach these two kinds of objects in the same two ways respectively when it is not a matter of talking about them but of manipulating them?

Strategy

Variation in discourse context (activity type, function) is the most likely motivator for switch between linguistic frames of reference. But this is an area we have not yet thought about in terms of offering suggestions for group research. Suggestions are very much encouraged.

Instead, in what we are proposing here, we are keeping our linguistic elicitation to the same scale and to the same social context in which any eventual cognitive investigations will also be carried out. That means that our language data will match our experimental conditions -- even if it doesn't capture all facets of natural usage. We have been thinking about permutations of small or toy objects displayed on table-top scale in simple relationships.

We are investigating the idea that the nature and the disposition of the Figure-Ground objects themselves is a parameter that is relevant to making the switch between linguistic frames of reference across languages. We have followed up five variables on this front and selected a range of objects for researchers to consider using in elicitation and in pilot non-linguistic tasks. Clearly, there are MANY other variables that might be relevant here. Obvious examples are animacy and personhood. If you have any ideas about possibly relevant variables in your language, PLEASE investigate them.

1. Capable of Motion/ Still
2. Facedness (but without implied motion)/ Non-facedness
3. Toy/ Real Object
4. Asymmetrical/ Symmetrical Object
5. Abstract/ Named Object

Materials

We have provided you with two each of the following objects. Feel free to add ideas and use objects that will illuminate new variables.

We suspect that the area of objects with recognizable faces and with a canonical orientation but without motion will be one of the most interesting from a cross-linguistic perspective. The chair, gun, and shoe below belong to this category. Other examples of objects in this category include baseball hats, radios, clocks, pianos, tools, telephones, (toy) houses. The fact of "facedness" will vary across cultures of course.

The objects are divided into three conceptual sets, on the basis of the 5 variables above. Set A consists of all the objects with a single feature or with symmetry of features. The diamond, padlock, matchbox, washbasin, link, and frying pan belong to Set A. Set B consists of those objects with facedness but without motion. The iron, chair and shoe belong to set B. Set C consists of things that move. The car and person belong to Set C.

	Motion	Face	Toy	Symmetry	Abstract
wooden diamond	-	-	?	+	+
closed padlock	-	-	-	+	-
closed matchbox	-	-	-	+	-
washbasin	-	-	+	+	-
plastic link	-	?	?	-	+
open padlock	-	-	-	-	-
open matchbox	-	-	-	-	-
frying pan	-	?	+	-	-
iron	-	+	-	-	-
jug	-	+	-	-	-
chair	-	+	+	-	-
shoe	?	+	-	-	-
car	+	+	+	-	-
person	+	+	+	-	-

Both the elicitation and the non-linguistic task outlined below require in addition to these objects an assortment of objects that are unfeatured in the 2 horizontal dimensions (round or square or conical or whatever). Tinker Toy parts can be good for this, as can the blocks we will be using for our motion landscapes. In the photographs that will guide you in setting up the arrangements, the unfeatured object is always represented by a Tinker Toy wheel. But you can use other objects at will, to make the arrangements more varied, colourful, interesting for your informants.

Procedure

Linguistic elicitation

You will be given two sets of objects, and a set of photographs showing various possible pairings of one featured and one unfeatured object. You may not have exactly the same colours or styles as the photos, but you can use them as a guide for yourself in setting up a pair of objects that a Director can describe to a Matcher under side-by-side blind conditions just as we have done previously (Object-object matching).

NB. Two of the photographs in the set show a toy iron in various orientations. A toy gun has been substituted for this object since the pictures were taken. The guns have to be filled with a little water or sand before they will stand up in all the right ways.

The photographs have been designed to provide cases in which the Intrinsic description will contrast both with the Absolute and the Egomorphic. Feel free to use other kinds of objects in new layouts to discover where (if anywhere) the fault lines lie in your language among its alternative frames of reference under table-top conditions.

There are two photographs of each featured object. In one photo, the featured object appears in an ACROSS relationship to the unfeatured object (that is, egomorphically right or left of it). In the other photo, the featured object appears in an AWAY relationship to the unfeatured object (that is, egomorphically in front of or behind

it). In ACROSS relationship photos, the featured object is placed so that the unfeatured object is located at its "face" or at a "feature". (2) In AWAY relationship photos the featured object is placed so that the unfeatured object is to it's "side" or to the side of a "feature". This means that Egomorphic encoding and Intrinsic encoding are always distinct.

Non-linguistic pilot tests

Explanation

The same photographs and the same objects are to be used for pilot testing of people's approaches to non-linguistic tasks. The central idea is to set up a problem in which the informants' choice of solution shows clearly whether she is using an Absolute, an Intrinsic, or an Egomorphic strategy. Our effort over the past few weeks has been to find a situation in which this would be so. We think we have achieved it by combining a 180 degree rotation of the speaker with a 90 or 180 degree rotation of the featured object in the display.

The rotation of the speaker distinguishes Absolute from Egomorphic solutions, as in Levinson's original maze and chips tasks. The rotation of the display object distinguishes Intrinsic from other solutions by creating a situation in which a choice must be made between a solution that respects the AWAY (front/back) axis for Intrinsic and one that respects the ACROSS (right/left) axis for Egomorphic and Absolute together. [Or vice versa. That is, a choice between a solution that respects the ACROSS (right/left) axis for Intrinsic as against the AWAY (front/back) axis for Egomorphic and Absolute together]. See discussion of linguistic elicitation task above.

In the design, arrangements that force a choice between Intrinsic-AWAY and nonIntrinsic-ACROSS alternate with those that force a choice between Intrinsic-ACROSS and nonIntrinsic-AWAY. We also alternate the particular values on both the AWAY axis (right or left) and the ACROSS axis (front or back). The design does NOT build in the contrast between two axes of an Absolute system. Anyone who is interested in looking at that factor should simply perform twice as many pilots, one set of pilots on each of the two axes (e.g. North-South plus East-West, uphill-downhill plus traverse).

In piloting the non-linguistic tasks with Dutch and English thinkers, we have found that once the Intrinsic frame is provided as an option, it is hard to find situations in which people will use any other frame in non-linguistic tasks. Dealing with objects which have faces but no implied motion is one factor in prompting a switch out of the intrinsic frame. Placing the objects relatively far apart on the table is another, and so is presenting objects in non-canonical orientation in the original display. All of these factors are incorporated in the present design. There is a tendency in our Europeans for the AWAY axis to be favoured over the ACROSS axis in general, so that they more readily abandon the Intrinsic where the Egomorphic solution offers a "front back" parameter. Is this universal?

Rotation out of canonical position is hypothesized (Levelt 1984) as one variable which weakens the Intrinsic frame of reference in European languages. For this reason, featured objects which have a canonical position (sets A and B) never appear in that position in the photos. However, if your informants find this difficult, you can achieve the

same contrast between ACROSS and AWAY by leaving the object in caononical position but rotating it 90 degrees in the horizontal. So, have the toy person (or jug or chair) "looking at" the unfeatured object in an ACROSS relation in the original, and have it "looking toward" your informant on the second table. Your informant must then choose, in rebuilding, between respecting the Intrisinsic but not the Egomorphic (rebuild to presrve the "looking at" relation in the AWAY axis) or respecting the Egomorphic but not the Intrinsic (rebuild to preerve the ACROSS relation but not the "looking at" relation).

Making your own intrinsic picture-guides (photos or sketches):

Each featured object (e.g. "radio", "ceremonial head-dress") should appear in one ACROSS and one AWAY relation with the unfeatured object (Tinker Toy wheel).

To randomize the factor of value on the different axes (featured object left or right? front or back?) and the factor of featured or unfeatured object to be presented as probe, we arbitrarily *paired* the featured objects with one another. So it is easiest if new featured object ideas are brought into the study in pairs (which do not have to be conceptually related). Decide that the "radio" is paired with the "ceremonial head-dress" and proceed as follows:

Within pairs of featured objects, vary the value of the featured object on the two axes. So if the "radio" is left of the Tinker Toy in the ACROSS picture and in front of it in the AWAY picture, make the "ceremonial head-dress" to the right of the Tinker Toy in the ACROSS picture and behind it in the AWAY picture.

Now assign x and y values to your pictures. These should neutralize the AWAY/ACROSS boundary within your pair. So if the "radio" is an x picture in the ACROSS relation and a y picture in the AWAY relation, make the ceremonial head-dress an x picture in the AWAY relation and a y picture in the ACROSS relation.

Specific Instructions

For specifics of individual pilot runs, refer to the attached page: "Instructions for use of Intrinsic Scoring Sheet". Before beginning the trials on your prepared coding sheet, take your informant through one practice trial, using any featured/unfeatured relationship. The unfeatured object should be the probe at table two in the practice trial. There is no right or wrong answer on the practice trial, it just assures you that the informant knows what to do.

Following a planned order and modelling from a photograph or other guide, the investigator shows an arrangement of one featured and one unfeatured object to an informant. The design calls for all of the objects without faces (Set A) to be presented before any of those with faces (Sets A and B), to avoid setting up strong Intrinsic expectations.

The investigator asks the informant "to remember how the objects are" -- say this as neutrally as possible in the language you are working with. i.e. avoid formulations such as "how they are oriented, where they are" etc. When the informant indicates that she has seen enough, she is asked to wait or is given something else to do for 30 seconds, and

then she is rotated 180 degrees to another table. The investigator or an assistant says

"Now I'd like you to set the things up again as close as you can to how you remember them. I'm going to help you by giving you the first one".

The investigator sets down the duplicate of one of the two original objects in the centre of the second table. In half of the cases the object supplied will be the unfeatured object. In half, it will be the featured object under a different rotation (again, referring to a plan and a photo to guide; see below).

In instructions, it is important not to refer to the arrangement in the singular ("set it up again") but as a multiplicity of objects ("set them up again"). It is also important to talk about setting things up as the informant "remembers" and not "how they were before". Allow for the fact that under the new rotation of the featured object the informant can see perfectly well that something is going to have to be different. Use a formula like "as close as you can", "as best you can". People often want to re-orient the featured object before re-building the configuration. Allow this, and accept the resulting rebuilding. But then re-provide the rotated object, and say

"and how would you do it if this one had to stay like this? As best you can."

Instructions should be given in the informant's native language. In acknowledging people's responses, vague praise is best. "Great". "Fine". "Good". If you think it useful, reassure people that there is no right answer, or that you yourself don't know the answers. Alternatively, set yourself up as a learner, interested in finding out *from them* what is the right way of doing things.

At the second table, and after the informant has been rotated 180 degrees, the duplicate of one of the two objects from the first arrangement is presented to her, in the centre of the table. This is the Probe. When the unfeatured object is the Probe, simply place it in the same orientation as in the original arrangement.

When the featured object is presented as the probe at table 2 it is always presented as follows, no matter what the orientation of the featured object in the original arrangement at table 1: Present all the faced objects (Sets B and C) in their canonical vertical orientation (right-way-up) and with their fronts pointing toward your informant as she stands at table 2. Present the other objects (Set A) in their usual vertical orientation (right-way-up) and in 90 degree rotation through the horizontal from the way they were oriented in the arrangement at table 1.

For pilot purposes, four or five informants are enough. Do not do the pilots more times than you think will be useful to indicate trends or problems. If you want to keep working on this issue, it will be more useful and rewarding for you to put your energy into finding new parameters relevant to the switch in reference frames in your language, and in running new pilot non-linguistic tasks on those variables, using this design if it seems useful, than into repeating these particular tasks at this stage.

Coding

Code the re-building that the informant produces. The prediction is simply that no informant will use a strategy in the non-linguistic task which she does not use in the linguistic one. (So no pure Absolute strategies in Dutch, no pure Egomorphic strategies in Tzeltal etc.)

A. Unfeatured Probe: When the unfeatured object is presented, anyone who is engaging in the task is likely to place the featured object with its intrinsic relation to the unfeatured one as it was in the original. For some people, this may be all that they will do (pure Intrinsic). Others will use additional strategies -- Absolute or Egomorphic, and this will be clear under 180 degree rotation of the speaker, as in Levinson's original maze and chips tasks. When the unfeatured object is provided, the informant's re-building is therefore to be coded as one of:

1. Random
2. pure Intrinsic
3. Absolute-plus-Intrinsic
4. Egomorphic-plus-Intrinsic

B. Featured Probe: Because the featured object is presented under a new rotation, people must make a 3-way choice about which strategy they will use. All of the rotations have been designed so that thinkers who approach the problem from an Intrinsic perspective will find a unique solution with respect to those who approach it from either an Absolute or an Egomorphic point of view. These latter will also be distinct from one another, because of the 180 rotation of the informant. Where the featured object is provided, the informant's rebuilding is to be coded as one of:

1. Random
2. Intrinsic
3. Absolute
4. Egomorphic

References

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Levelt, Willem. 1984. Some Perceptual Limitations on Talking About Space. Limits in Perception (A. van Doorn, W. de Grind, and J. Koenderink, eds.), pp. 323-358. Utrecht: VNU Science Press.

Miller, G. and Johnson-Laird, P. 1976. Language and Perception. Massachusetts: Harvard University Press.

Instructions for use of Intrinsic scoring sheet

PREPARATION

1. Select. Using pictures which represent your own interests, or using the set of photos supplied, identify a set of featured-unfeatured object relations to examine.

2. Randomize. Randomly shuffle the pictures. For the photos supplied, shuffle separately within each of the 3 conceptual sets (A B and C).

3. Counterbalance. The photos have been systematically assigned into two classes x and y. For each administration, you must assign one of the two classes to be those that receive the unfeatured item as probe on table two and the other to be those that receive the featured item as a probe. This assignment should vary across informants (e.g., informants 1: x=unfeatured, y=featured; informant 2: x=featured, y=unfeatured.)

4. Prepare coding sheet. Beginning with the set of pictures that you think is least likely to elicit an intrinsic response (Set A of the supplied photos) list the pictures on the coding sheet in the order they appear after shuffling, which represents the order in which they will be presented. Record for each picture the name of the featured object, which object is to be given as a probe (see #2 above) and whether the relation between the two objects is an AWAY or an ACROSS relation in the speaker's plane. Do the same for Set B and Set C on the reverse side of the coding sheet. Follow this order for presentation, presenting all of set A first, then set B, then Set C. A sample partially filled-in coding sheet appears on the next page.

ADMINISTRATION

5. Informant Data. Record the relevant information.

6. Table one. Ask your informant to remember how the objects are. When she is ready, remove the array.

7. Wait. 30 seconds

8. Table two. Present the probe object in the centre of the table. **When the featured object is probe**, present faced objects [Sets B and C] in their canonical vertical orientation (right-way-up) and with their faces pointing toward your informant as she stands at table two. Present other featured objects [set C] in their usual vertical orientation (right-way-up) and in 90 degree rotation through the horizontal from the way they were oriented in the arrangement at table one.

9. Record Placement Response. By circling the relevant x on the coding sheet. The x's are intended to show table two egomorphically -- that is, as the informant is looking at it. Draw in unusual responses. Record orientation of the featured object (where not identical to the original array) in the column next to the x's.

10. Comments. Any other information

Subject Number _____ X= featured Age _____ Other Languages _____

Subject Name _____ Sex _____ Literacy/Education _____

A. Featured, +/- Symmetry

	featured item	probe: featured (=f) / unfeatured (=u)	egomorphic: away (=w) / across(=c)		featured object orientation	comments
1.	diamond	(f) / u	(w) / c	(x) x ▪ x x		
2.	lock	f / (u)	w / (c)	x (⊙) x ▪ x x	lock placed lying down	
3.		f / u	w / c	x x ▪ x x		
4.		f / u	w / c	x x ▪ x x		
5.		f / u	w / c	x x ▪ x x		
6.		f / u	w / c	x x ▪ x x		
7.		f / u	w / c	x x ▪ x x		
8.		f / u	w / c	x x ▪ x x		
9.		f / u	w / c	x x ▪ x x		
10.		f / u	w / c	x x ▪ x x		
11.		f / u	w / c	x x ▪ x x		
12.		f / u	w / c	x x ▪ x x		
13.		f / u	w / c	x x ▪ x x		
14.		f / u	w / c	x x ▪ x x		
15.		f / u	w / c	x x ▪ x x		
16.		f / u	w / c	x x ▪ x x		

example

Exploring the Intrinsic Frame of Reference / Scoring Sheet

Subject Number _____ X= _____ Age _____ Other Languages _____

Subject Name _____ Sex _____ Literacy/Education _____

A. Featured, +/- Symmetry

	featured item	probe: featured (=f) / unfeatured (=u)	egomorphic: away (=w) / across(=c)		featured object orientation	comments
1.		f / u	w / c	x x ▪ x x		
2.		f / u	w / c	x x ▪ x x		
3.		f / u	w / c	x x ▪ x x		
4.		f / u	w / c	x x ▪ x x		
5.		f / u	w / c	x x ▪ x x		
6.		f / u	w / c	x x ▪ x x		
7.		f / u	w / c	x x ▪ x x		
8.		f / u	w / c	x x ▪ x x		
9.		f / u	w / c	x x ▪ x x		
10.		f / u	w / c	x x ▪ x x		
11.		f / u	w / c	x x ▪ x x		
12.		f / u	w / c	x x ▪ x x		
13.		f / u	w / c	x x ▪ x x		
14.		f / u	w / c	x x ▪ x x		
15.		f / u	w / c	x x ▪ x x		
16.		f / u	w / c	x x ▪ x x		

B. Objects with Fronts (-motion)

	featured item	probe: featured (=f) / unfeatured (=u)	egomorphic: away (=w) / across(=c)		featured object orientation	comments
17.		f / u	w / c	x x ▪ x x		
18.		f / u	w / c	x x ▪ x x		
19.		f / u	w / c	x x ▪ x x		
20.		f / u	w / c	x x ▪ x x		
21.		f / u	w / c	x x ▪ x x		
22.		f / u	w / c	x x ▪ x x		
23.		f / u	w / c	x x ▪ x x		
24.		f / u	w / c	x x ▪ x x		

C. Canonical Orientation + Motion

	featured item	probe: featured (=f) / unfeatured (=u)	egomorphic: away (=w) / across(=c)		featured object orientation	comments
25.		f / u	w / c	x x ▪ x x		
26.		f / u	w / c	x x ▪ x x		
27.		f / u	w / c	x x ▪ x x		
28.		f / u	w / c	x x ▪ x x		

Comments: