

Supplemental material 1:

Set-up of the disambiguation task used in Study 1



The set-up of the reference disambiguation task used in Study 1. Participants sat facing the fireplace, with four objects on one side (toward the door) and a matching set of the same four objects on the other side (away from the door).

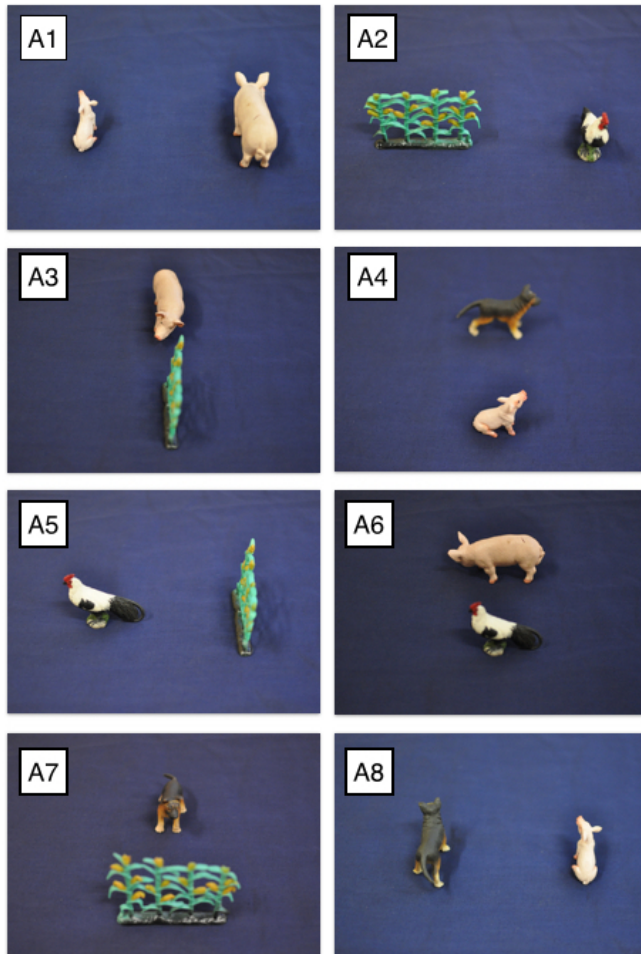
Supplemental material 2:
Stimuli for Study 1

- 1) wisi-den mori suwa
up.that-gen.adv orange point.2s.nearfut
'Point to the uphill orange.'
- 2) imi-den mori suwa
down.that-gen.adv orange point.2s.nearfut
'Point to the downhill orange.'
- 3) wisi-den tomato suwa
up.that-gen.adv tree.tomato point.2s.nearfut
'Point to the uphill tomato.'
- 4) imi-den tomato suwa
down.that-gen.adv tree.tomato point.2s.nearfut
'Point to the downhill tomato.'
- 5) yik abida-ŋ a-wu
bag hold-SS s.obj-come.up.2s.nearfut
'Bring up the bag.'
- 6) yik abida-ŋ a-bi
bag hold-SS s.obj-come.down.2s.nearfut
'Bring down the bag.'
- 7) kap abida-ŋ a-wu
cup hold-SS s.obj-come.up.2s.nearfut
'Bring up the cup.'
- 8) kap abida-ŋ a-bi
cup hold-SS s.obj-come.down.2s.nearfut
'Bring down the cup.'

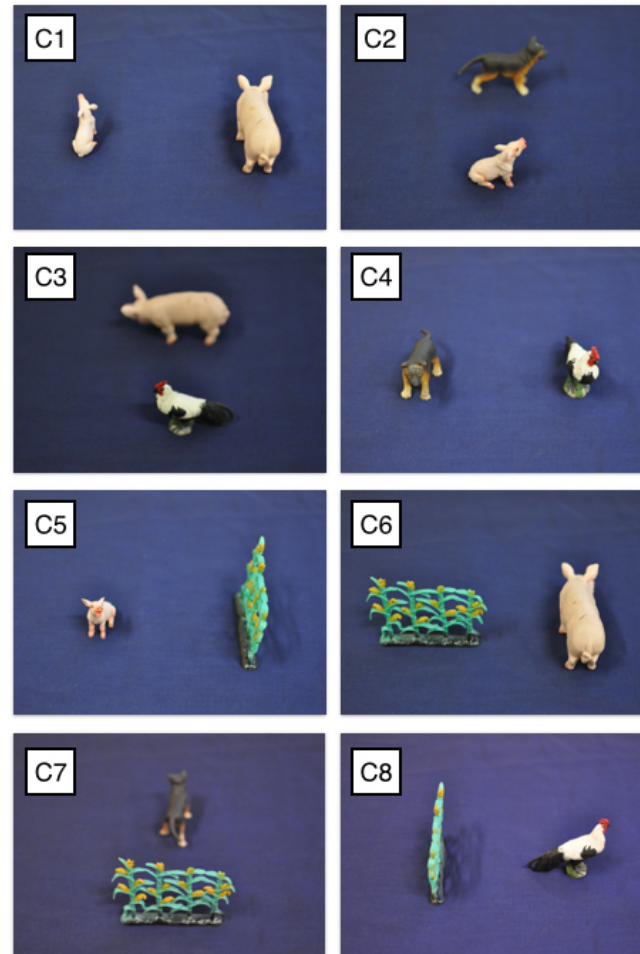
Supplemental material 3:
Arrays used in the 'Pig & Corn' task

“PIG AND CORN” STIMULI

ADULT ARRAYS



CHILD ARRAYS



Supplemental material 4:

Complete transcripts of all examples

Study 2:

Example 1. Outdoors, participants facing WSW (position B)

director:

bit maluŋ-gok amin tim-ni a-bi isi-don
pig small-dim one nose-3.poss move-2s.DS up.that-loc

iraisa-da yuma-gan on-gan-da y-ipm-ek e
PN-subj area-loc that-loc-adv 3s.obj-put-SS.D and

a-wo-ŋban e piŋan yo gwin yaŋ-gin y-ip-bi
s.obj-go.up-3s.DS and dog too all thus-just 3s.obj-put-2s.fut

translation: ‘Point the nose of the small pig towards Raisa’s area up there. Going up, put the dog just like that too.’

Example 2. Outdoors, facing WSW (position B)

director:

bit meŋ-i-da mibiltok gw-imi-deŋ wusi-k
pig mother-3.poss-subj first secondary-down.that-gen.adv look.for-SS.D

ak-dak
stand-3s.pres

aka pup nan-i yo gwin a-biŋ-ban
disc chicken father-3.poss too all 3s.obj-come.down-3s.DS

imi-deŋ wusi-k ak-dak
down.that-gen.adv look.for-SS.D stand-3s.pres

translation: ‘The big pig first is looking downwards. The rooster too, coming down—it is looking downwards.’

Example 3. Indoors, facing WSW (position B)

director:

pup nan-i busuŋ-o y-ip-bi
chicken father-3.poss head-poss 3s.obj-put-2s.DS

on ga-ga yik-dal tet-gin tibil a-kan
that 2s-emph sit-2s.pres side-loc turn do-3s.DS.D

isit yut barat-da y-ip-bi
corn plant flat-adv 3s.obj-put-2s.fut

pup nan-i busuŋ-o y-ip-bi i-deŋ
chicken father-3.poss head-poss 3s.obj-put-2s.DS this-gen.adv

w-akan
come.up-3s.DS.D

ga-ga yik-dal-gin w-akan
2s-emph sit-2s.pres-loc come.up-3s.DS.D

isit yut barat-da y-ip-bi imin tiroŋ-gin
corn plant flat-adv 3s.obj-put-2s.DS down.that door.area-loc

ki-sak
go-3s.fut

translation: 'Put the rooster's head facing that side where you are sitting. Put the corn horizontal. Put the rooster's head coming up here, toward where you are sitting. Put the corn plant horizontal toward that door area down there.'

Example 4. Indoors, facing ENE (position A)

director:

kili isit-naŋ aŋ-tibil yomaga-gin y-ipmaŋ-dal
disc corn-s.obj s.obj-turn.SS door-loc 3s.obj-put-2s.pres

y-ip-bi imi-deŋ ki-sak
3s.obj-put-2s.DS down.that-gen.adv go-3s.fut

kili pup nan-i y-ipmaŋ-bi isin
disc chicken father-3.poss 3s.obj-put-2s.DS up.that

yut-dom-gan tibil-jak
house-wall-loc turn-3s.fut

translation: 'Okay, turn the corn and put it toward the door. Put it towards down there. Okay, put the rooster turned toward that wall up there.'

Study 3

Example 5. Indoors, facing ENE (position A)

director:

bit kwin-da y-ip-bi tim-i imin abilak
pig above-adv 3s.obj-put-2s.DS nose-3.poss down.that fire.place

ka-ŋgan piki-akan
inside-loc go.down-3s.DS.D

isit y-ip-bi imin tet-gan pikw-an
corn 3s.obj-put-2s.DS down.that side-loc go.down-3s.nearfut

translation: 'Put the pig above with its nose going down toward the fire down there. Put the corn down toward that side down there.'

Example 6. Indoors, facing ENE (position A)

director:

piŋan-kat bit meŋ-i-gat aŋ-tobil isi-deŋ tet-gin-da
dog-com pig mother-3.poss-com s.obj-turn.SS up.that-gen.adv side-loc-adv

y-ipmaŋ
3s.obj-put.2s.nearfut

translation: 'Put the pig and dog turned toward the side up there.'

Study 3 — Additional example

Example 7. Indoors, facing ENE (position A)

director:

isit barat-da ga-ga yik-dal-on y-ipm-ek
corn flat-adv 2s-emph sit-2s.pres-loc 3s.obj-put-SS.D

a-wo-ŋban piŋan-aŋ isin tet-gan aŋ-tobil ek
s.obj-go.up-3s.DS dog-s.obj up.that side-loc s.obj-turn do.SS.D

y-ip
3s.obj-put.2s.nearfut

matcher:

pom tet
far.from.door side

director:

isin tet-da isin amin yik-gaŋ tet-gan
up.that side-adv up.that people sit-3s.pres side-loc

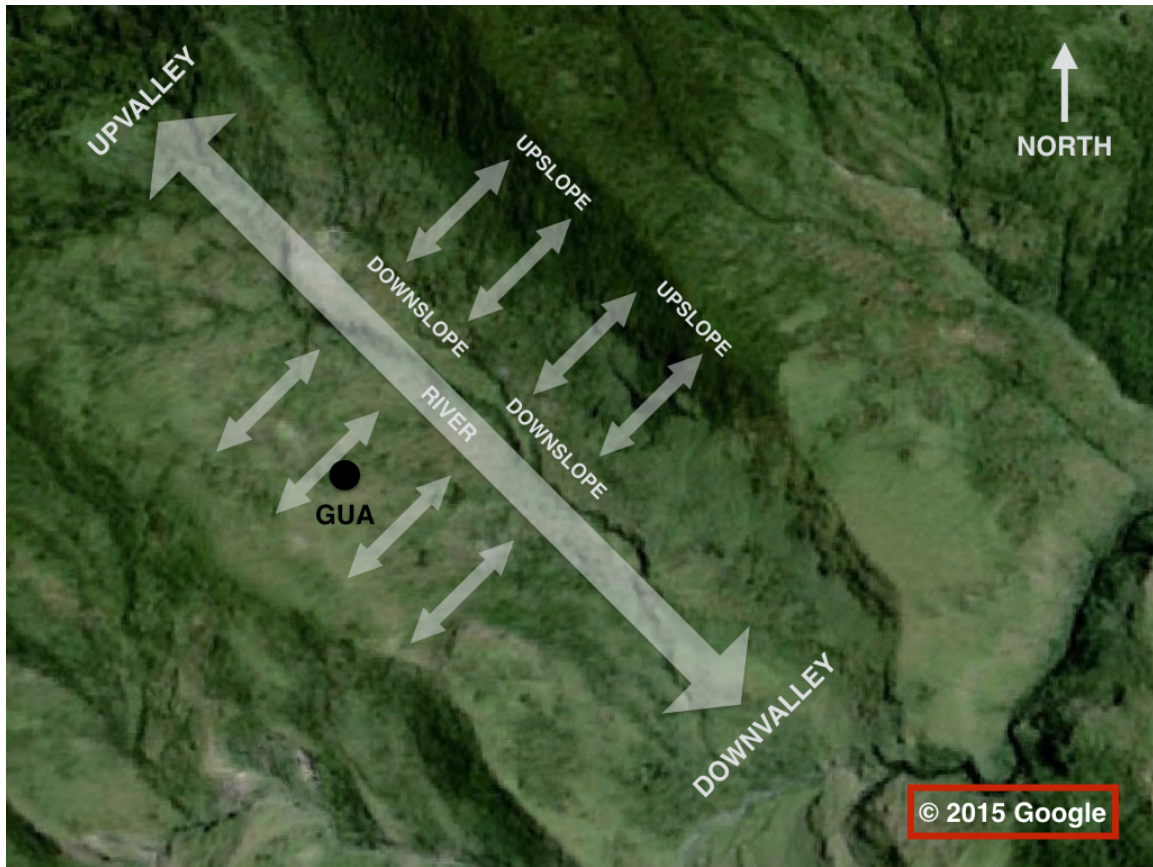
translation:

Director: 'Put the corn horizontal where you are sitting. Going up, turn the dog facing the side up there.'

Matcher: 'The side away from the door?'

Director: 'The side up there, where those people up there are sitting.'

Supplemental material 5:
Satellite imagery of the terrain



Satellite imagery showing the terrain surrounding Gua village, where the present studies were conducted. Gua is situated in a valley—one of several such valleys within the broader Yupno valley—that is bisected by the Daldal river. When in Gua, the slope toward and away from the Daldal is steep whereas the axis along the river is comparatively gentle.