The question of how the language we speak reflects or influences our view of the world, or our very thought processes, is one of considerable interest to many people but also a difficult one to answer. Today we'll consider various points of view, and some evidence that's relevant in assessing them.

The Sapir-Whorf hypothesis can be stated in this way.

1. Structural differences between language systems will, in general, be paralleled by nonlinguistic cognitive differences, of an unspecified sort, in the native speakers of the two languages.
2. The structure of anyone's native language strongly influences or fully determines the world-view he or she will acquire while learning the language.

It's possible to make strong or weak versions of these claims. The strong version is clearly false, and most linguists feel that the versions that are weak enough to be plausible aren't very interesting.

Pinker gives a range of evidence against the view that language is what we use for thinking. It can be summarized as follows.

1. Supposed limitations on expression in various languages are based on faulty linguistic understanding.
   - Hopi does have words for time, etc.
   - Translation between languages is possible (even if difficult to do elegantly).
2. Thought is possible without language.
   - Adults who have grown up without language.
   - Babies before they learn language.
   - Primates and other animals that never learn language.
   - Adults who reason and create in visual or other modes.
3. Language is an inadequate medium for the direct encoding of thought.
   - We often can't think of the right word to express ourselves.
   - Language contains ambiguity, homophony, etc.
   - Manipulation of visual images is done directly.

Instead, thought is encoded in something distinct from normal language, which he calls mentalese. Today we'll talk about a few examples, which partly overlap with Pinker's discussion.

Language as a reflection of culture

One obvious way in which languages may differ is in the nature of their vocabulary. A famous example -- often mischaracterized -- is the number of Eskimo words for "snow."

This issue was first brought to scholarly attention in 1911 by the anthropologist and linguist Franz Boas, in the introduction to his book *The Handbook of North American Indians*, Boas said that Eskimos have four different words for snow, where English has just one.

- **aput** for snow on the ground
- **qana** for falling snow
- **piqsirpoq** for drifting snow
- **qimuqsuq** for a snowdrift

English can only make similar distinctions by modifying the basic word **snow**, as in the translations given.

Boas didn't make too much of this observation, but Benjamin Lee Whorf -- an amateur linguist who was convinced that
language had a strong effect on thought -- focused on the lack of a common term in Eskimo. Writing in *Technology Review*:

"We have the same word for falling snow, snow on the ground, snow packed hard like ice, slushy snow, wind-driven flying snow -- whatever the situation may be. To an Eskimo, this all-inclusive word would be almost unthinkable; he would say that falling snow, slushy snow, and so on, are sensuously and operationally different, different things to contend with; he uses different words for them and for other kinds of snow."

The difference in vocabulary is taken by Whorf as evidence for a difference in attitude or perception. (It's important to note that he did not investigate what the actual attitudes or perceptions were, severely undermining the basis of his claim.)

Over the years the claims regarding the number of words for "snow" in Eskimo have become more and more outlandish, ranging up to the hundreds. Even if true, this fact would not be of much interest, any more than the fact that farmers have lots of words for farm implements, and doctors know lots of words for diseases.

But in fact, setting aside complications in actually coming up with a firm number, there are perhaps 12-15 words in Eskimo for snow and related phenomena. (See this discussion of the details by an expert in Eskimo languages.)

That's not much different from what we can find in English. As in Eskimo, some of these words have other meanings unrelated to snow.

- avalanche
- blizzard
- dusting
- flurry
- frost
- hail
- hardpack
- powder
- sleet
- slush
- etc.

The real point, as Boas and Whorf originally made it, refers to the way the two languages divide up the world. It's true that Eskimo uses unrelated words to name snow that's falling and snow that's already on the ground. These examples are from Central Alaskan Yupik, one of the five Eskimo languages.

qanuk = "falling snow, snowflake"

aniu = "snow on the ground"

In English, of course, one word describes both of these: if you say "look at the snow!" you could be referring to either type.

<table>
<thead>
<tr>
<th>English</th>
<th>Yupik</th>
</tr>
</thead>
<tbody>
<tr>
<td>snow</td>
<td>qanuk</td>
</tr>
<tr>
<td></td>
<td>aniu</td>
</tr>
</tbody>
</table>

It's not as though we don't know the difference! The context typically makes it clear, and adding words will distinguish the two.

"look at all that snow coming down!"

"look at all the snow piled up on the ground!"
Obviously having a single word doesn't mean you can't conceive of subtypes of the same thing. But what about the converse: Does the lack of a common term inhibit thinking about two things as similar?

It should be noted that claims like this have typically been made about cultures other than the one to which the researcher belongs. At best, it’s a fascination with the "exotic" that encourages these claims. More seriously, to the extent these claims imply more limited thought processes, it’s hard not to see them as racist.

Thus, while we can point out things about Eskimo words for "snow," it’s not so different from the situation in Ancient Greek.

\[
\text{néiphein} = "\text{to snow}"
\]

\[
\text{niphás} = "\text{snowflake}"
\]

\[
\text{khiôn} = "\text{snow (on the ground or falling)}"
\]

The basic word for "snow" is unrelated to the verb, and to "snowflake." But does that mean Plato didn’t realize their connection? Funny how Whorf never made that claim.

We could make the same point about these words in English, which are unrelated to one another as words but not as things in the world. (Boas gives similar examples as a parallel to Eskimo snow.)

\[
\text{water}
\]
\[
\text{rain}
\]
\[
\text{puddle}
\]
\[
\text{dew}
\]
\[
\text{wave}
\]
\[
\text{foam}
\]
\[
\text{river}
\]
\[
\text{stream}
\]
\[
\text{lake}
\]
\[
\text{ocean}
\]

We realize that rain is water falling from the sky, and that snow is a related phenomenon, even though there’s no independent cover term for them. (Precipitation is a modern scientific term, and essentially just means "things that fall.")

We know this because we can observe rain turning to snow as the temperature changes, as we can see water turning to ice when it's on the ground.

Notice here we distinguish falling rain from water on the ground! And rainwater is a kind of water, not a kind of rain.

The specific vocabulary items aren’t what determine our understanding of the world. If we were Martian linguists, perhaps we would marvel at the quaint English language and how many different words it has for water in various shapes and sizes -- even though it’s all just H₂O! Water must be really important in England.

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**Categorizing the world**

The idea that the vocabulary of a language traps its speakers into thinking only in those terms is easily disproved. For example, in English animal terms, there's a different range of detail available for various animals. Here's a basic schema.
Let's start with **humans**, which are the most elaborately described species. (There are, of course, other categories such as *adolescent*, not discussed here.)

<table>
<thead>
<tr>
<th>species</th>
</tr>
</thead>
<tbody>
<tr>
<td>immature</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
<tr>
<td>mature</td>
</tr>
<tr>
<td>male</td>
</tr>
<tr>
<td>female</td>
</tr>
</tbody>
</table>

**person, human, man***

<table>
<thead>
<tr>
<th>child</th>
<th>adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>boy</td>
<td>man</td>
</tr>
<tr>
<td>girl</td>
<td>woman</td>
</tr>
</tbody>
</table>

In an older style of use, often considered to be sexist today, there's overlap in the terminology, since *man* is used for a superordinate category (as in *man's inhumanity to man*).

That makes the word **polysemous** for those who use it in this fashion: it has more than one meaning.

Various sorts of overlap are typical for animals. It's not surprising that the vocabulary is limited for animals with which English speakers have minimal contact, and more elaborate for animals with a greater cultural importance -- including humans!

Consider first an animal of cultural importance, the **horse**. (There are more specialized terms, such as *gelding*, that are not considered here because they encode other types of meaning. The same goes for some of the other animals below.)

**horse**

<table>
<thead>
<tr>
<th>foal</th>
<th>horse*</th>
</tr>
</thead>
<tbody>
<tr>
<td>colt</td>
<td>filly</td>
</tr>
<tr>
<td>stallion</td>
<td>mare</td>
</tr>
</tbody>
</table>

The word *horse* is thus **polysemous**: it can mean "adult horse" or just "horse" regardless of age. This is the general pattern for English animal terms.

Other animals have just one term for the immature animal, regardless of sex. Does that mean that speakers of English think sheep have no sexual differences until maturity? No, it just means the language doesn't bother to express a notion that is nevertheless understood.

**sheep**

<table>
<thead>
<tr>
<th>sheep*</th>
</tr>
</thead>
<tbody>
<tr>
<td>lamb</td>
</tr>
<tr>
<td>ram</td>
</tr>
<tr>
<td>ewe</td>
</tr>
</tbody>
</table>

For most animals, such as *elephant*, only one basic term exists.
Adoption of terms from other species is necessary to create distinctions when necessary, such as cows. Again, this shows awareness of the concepts even in the absence of special vocabulary.

Interestingly, the most general category isn't actually very well handled in English for cows.

There are two possibilities for the general term:

1. **cow**: ranchers generally use this term only for the female, but it's typically the general term for the layperson.
2. **cattle**: this is a non-count noun, so it's not possible to say *a cattle*; instead one has to count head of cattle, which means that general term ends up being the quite nonspecific head.

So for this animal we lack the simple equivalent of horse, but we can still understand the difference between cows (or cattle) in general and specifically female animals of the species.

Given any pair of languages, it's always possible to find a semantic distinction that's made in one but not the other. Take, for example, Russian and English.

**Russian** distinguishes two kinds of blue, darker and lighter, without a common term for them (other than sinij, which can sometimes serve that function).

<table>
<thead>
<tr>
<th>English</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>blue</td>
<td>sinij</td>
</tr>
<tr>
<td>dark blue</td>
<td>sinij</td>
</tr>
<tr>
<td>light blue</td>
<td>golubój</td>
</tr>
</tbody>
</table>

Of course, English can use a longer phrase to make a similar distinction, but it's done by modifying the general term.
Conversely, Russian (like many languages) uses the same word for *hand* and *arm*.

<table>
<thead>
<tr>
<th>English</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>hand</td>
<td>ruká</td>
</tr>
<tr>
<td>arm</td>
<td></td>
</tr>
</tbody>
</table>

Examples of the general character of *ruká* can be found in various expressions (showing different case forms of the noun) and derived words.

- **v ruké** "in one's hand"
- **zá ruku** "by the hand"

- **brat' ná ruki** "lift up in one's arms"
- **idtí pód ruku** "walk arm in arm"

- **rukáv** "sleeve"
- **rukavítsa** "mitten"

Notice that the choice of preposition helps distinguish the two basic senses. But Russian, like English for *blue*, can be more specific if necessary.

<table>
<thead>
<tr>
<th>English</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>hand</td>
<td>kist'</td>
</tr>
<tr>
<td></td>
<td>&quot;cluster, brush, hand&quot;</td>
</tr>
<tr>
<td>arm</td>
<td>ruká</td>
</tr>
</tbody>
</table>
|          | "hand, arm (especially)"

Such examples could easily be multiplied.

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**Color perception**

Languages differ in the way they split up the range of possible colors by means of color terms. Research on this issue often draws on sets of color chips, such as the following.

A useful experiment about the possible effect of color vocabulary on perception was done with speakers of English and Tarahumara, a native language of northern Mexico (Kay and Kempton 1984).

English, of course, has the two words *green* and *blue* among its eleven basic color terms.
Tarahumara, like many languages, has a single term that covers this range of color, siyóname. (Sometimes such words are translated as "grue," from green+blue. Here it's labeled "green.")

One might ask, then, whether speakers of the two languages in some way perceive the difference between these colors differently.

**Experiment I**

Subjects were shown three close colors in the blue-green range, and asked to choose the one that's most different from the other two. For example:
English speakers were found to be biased to group colors according to the words "green" and "blue," while Tarahumara speakers were not. That is, even when the middle color B was objectively closer to A than to C, an English speaker often would identify BC as the closest pairing if they both could be described by the same word. This happened only when the differences were subtle.

The explanation seems to be that, faced with difficult discriminatory task, people unconsciously look for another (easier) means of deciding, in this case by using the name strategy. So can this strategy be prevented, in order to test true perception?

**Experiment II**

In a second experiment, English speakers were shown only two of three adjacent colors at once, and asked to compare the degree to which A is greener than B:

![A B]

and the degree to which C is bluer than B:

![B C]

This time, there was no significant effect of vocabulary. That is, the same results were obtained whether or not B fell close to the boundary between green and blue.

The explanation is that the name strategy is pre-empted here since the instructions incorporate the color terms. Thus the language you speak can have an effect on the way you answer a question or perform a task, but does not prevent you from seeing things as they are once the interference from the language is removed.

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**Thinking for speaking**

Traditional descriptions of the relation between thought and language take a fairly static view.

"There resides in every language a characteristic world-view.... Man lives primarily with objects, [but] he actually does so exclusively as language presents them to him." (Wilhelm von Humboldt, 1836)

"Users of markedly different grammars are pointed by their grammars towards different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world." (Benjamin Lee Whorf, 1940)

Experiments suggest that the relevant issue is not thought (a static notion) so much as thinking, i.e. the specific task one
is performing (a more dynamic notion). In particular, when you're expressing thoughts in a particular language, you necessarily have to respect the important categories of that language, but if you choose you can include whatever extra information you want (Slobin 1996).

For example, some languages tend to express many aspectual distinctions, i.e. information about the internal temporal structure of an event. English happens to be fairly rich in this domain.

I went
I was going
I had gone
I will have gone
I will be going
etc.

In describing a picture like the following, English speakers normally make use of such distinctions.

English speakers say, for example:

The boy fell out... and the dog was being chased by the bees. (5 years old)

He's [the dog is] running through there, and he [the boy] fell off. (3 years, 8 months old)

Spanish speakers make similar distinctions.

Se cayó el niño y le perseguían al perro las avispas. (5 years old)
"The boy fell and the wasps were chasing the dog."

Se cayó... El perro está corriendo. (3 years, 4 months old)
"The boy fell... The dog was running."
Other languages, however, don't have verb inflections that make these distinctions so easy to express. In German, for example, the following verb forms are equivalent to more than one English verb aspect.

fellt = "falls" or "is falling"

*ist gefallen* = "fell" or "has fallen" or "was falling"

rennt = "runs" or "is running"

*rannte* = "ran" or "has run" or "was running"

When faced with the task of describing such a picture, German speakers often resort to indirect strategies such as the following:

*Der ist vom Baum runtergefallen und der Hund läuft schnell weg.* (5 years old)
"He fell down from the tree and the dog runs away quickly"

*Er rannte schneller und immer schneller.* (9 years old)
"He ran faster and faster"

*Der Hund rennt rennt rennt.* (adult)
"The dog runs runs runs"

A similar situation holds in Hebrew, where a speaker might or might not choose to distinguish the two actions.

*Hu nafal ve hakelev barax.* (5 years old)
"He fell and the dog ran away"

*Hayeled nafal... ve hakelev boreax.* (5 years old)
"The boy fell... and the dog runs away"

Thus all speakers are clearly aware of the aspect in the scenes, but they usually express only those aspectual distinctions that are built into the language. It's just a tendency, though:

one-fourth of the time, English and Spanish speakers fail to use relevant distinctions in their languages; and

three-fourths of the time, German and Hebrew speakers go out of their way to indicate the aspect indirectly.

First-language thinking is often found in second-language speaking: Slobin comments that

"once our minds have been trained in taking particular points of view for the purposes of speaking, it is exceptionally difficult for us to be retrained."

The difficulty of learning different distinctions in a second language results from linguistic habits transferred from one language to another, just as accent is the transfer of pronunciation habits. This is one way, then, in which the language we speak affects our thought processes. But the other evidence also shows that these are habits, rather than rigid limits.

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**Germanic prepositions**

Discussions of Sapir-Whorf typically focus on different cultures that also have different linguistic properties (such as English and Tarahumara). But quite similar cultures can also have significantly different linguistic properties, in which case it's rather implausible that the thought processes of the speakers are so different.

Consider some spatial prepositions from three West Germanic languages, which are linguistically and culturally closely related. They would be used to express some of the relationships seen in these drawings.
In German, two prepositions that would be rendered by English "on" are used, depending on the **orientation** of the surface to which something is attached (or in contact).

**auf** = **horizontal** surface

- cup on a table
- spider on a ceiling
- band-aid on shoulder

**an** = **vertical** surface, or no clear orientation

- picture, poster on a wall
- band-aid on leg
- raindrops on a window
- fly on a window
- leaves on a twig

In Dutch, on the other hand, the related prepositions are chosen depending on the **method** of attachment.

**aan** = attached by a **fixed point**; prevented from manifesting tendency toward separation

- clothes on a line
- coathook on a wall
- picture on a wall (hanging from a nail)
- apple on a twig
- icicles on a roof
- handle on a pan
- dog on a leash
- pull-toy on a string
- balloon on a string

**op** = supported from **underneath** (i.e. horizontally), or **broadly** on flattish surface, or **living** creature; seen as essentially stable

- cup on a table

- bandaid on a leg or shoulder
- poster on a wall (glued tight)
- sticker on a refrigerator
- paint on a door
- raindrops on a window
fly on a window
spider on a ceiling
snail on a wall

In English, of course, on is used for all of these relations. But the cultural and scientific traditions of Germany, Holland, and English are closely related and very similar. (Whorf considers them all as part of "Standard Average European" culture.)

If these fundamental spatial distinctions don't indicate differences in thought, then it's doubtful that any more "exotic" distinctions indicate anything significant about thought processes. Speakers of German or Dutch have to attend to these issues of orientation or attachment when choosing a preposition, but speakers of all languages understand the underlying concepts.

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