

Can robots be conscious?

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What is consciousness?

When is one not conscious?

- Dead person
- Sleeping person (sleepwalking?)
- Fainting
- In a coma (?)
- Insane person (?)
- ...

Intuitively, a person is conscious

- if they are aware, alert
- if they respond to stimuli
- if they show some autonomy, free will
- ...

Are animals conscious?

- Apes, gorillas, chimpanzees?
- Whales, dolphins?
- Cows, pigs, horses?
- Cat, dogs?
- Pigeons, chickens?
- Fish?
- Amoeba?

Consciousness among humans

- Are pygmies conscious?
- Are black persons conscious?
- Are infants conscious?
- Is a fetus conscious?
- ...

Some related concepts

- Personhood
- Free will
- Self
- Ability to feel
 - Emotions
 - Pain (babies don't feel pain?)

Example of personhood

US Constitution: Amendment V: No **person** shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a grand jury...

Standing Bear vs. General Crook (1879)

*Judge Dundy issues an order releasing
the Ponca Indians*

I must hold, that Indians, and
consequently the relators, are
persons, such as described by and
included within the laws before
quoted.

A related issue: Abortion

FETAL DEVELOPMENT



3.5 weeks

Day 1: fertilization: all human chromosomes are present; unique human life begins.
Day 6: embryo begins implantation in the uterus.
Day 22: heart begins to beat with the child's own blood, often a different type than the mothers'.
Week 3: By the end of third week the child's backbone spinal column and nervous system are forming. The liver, kidneys and intestines begin to take shape.



7.5 weeks

Week 4: By the end of week four the child is ten thousand times larger than the fertilized egg.
Week 5: Eyes, legs, and hands begin to develop.
Week 6: Brain waves are detectable; mouth and lips are present; fingernails are forming.
Week 7: Eyelids, and toes form, nose distinct. The baby is kicking and swimming.



8.5 weeks

Week 8: Every organ is in place, bones begin to replace cartilage, and fingerprints begin to form. By the 8th week the baby can begin to hear.



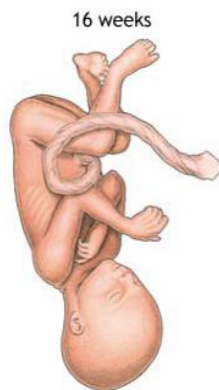
10 weeks

Weeks 9 and 10: Teeth begin to form, fingernails develop. The baby can turn his head, and frown. The baby can hiccup.
Weeks 10 and 11: The baby can "breathe" amniotic fluid and urinate.



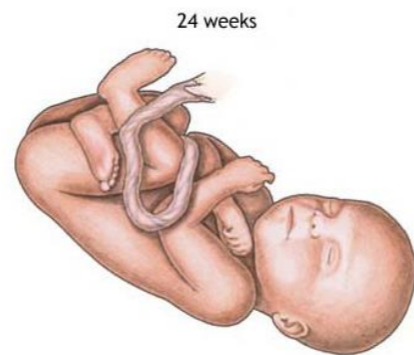
12 weeks

Week 11: the baby can grasp objects placed in its hand; all organ systems are functioning. The baby has a skeletal structure, nerves, and circulation.
Week 12: The baby has all of the parts necessary to experience pain, including nerves, spinal cord, and thalamus. Vocal cords are complete. The baby can suck its thumb.



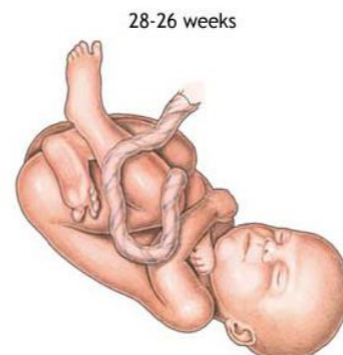
16 weeks

Week 14: At this age, the heart pumps several quarts of blood through the body every day.
Week 15: The baby has an adult's taste buds.
Month 4: Bone Marrow is now beginning to form. The heart is pumping 25 quarts of blood a day. By the end of month 4 the baby will be 8-10 inches in length and will weigh up to half a pound.



24 weeks

Week 17: The baby can have dream (REM) sleep.
Week 19: Babies can routinely be saved at 21 to 22 weeks after fertilization, and sometimes they can be saved even younger.
Week 20: The earliest stage at which Partial birth abortions are performed. At 20 weeks the baby recognizes its' mothers voice.



28-26 weeks

Months 5 and 6: The baby practices breathing by inhaling amniotic fluid into its developing lungs. The baby will grasp at the umbilical cord when it feels it. Most mothers feel an increase in movement, kicking, and hiccups from the baby. Oil and sweat glands are now functioning. The baby is now twelve inches long or more, and weighs up to one and a half pounds.



32-30 weeks

Months 7 through 9: Eyeteeth are present. The baby opens and closes his eyes. The baby is using four of the five senses (vision, hearing, taste, and touch.) He knows the difference between waking and sleeping, and can relate to the moods of the mother. The baby's skin begins to thicken, and a layer of fat is produced and stored beneath the skin. Antibodies are built up, and the baby's heart begins to pump 300 gallons of blood per day. Approximately one week before the birth the baby stops growing, and "drops" usually head down into the pelvic cavity.

Example 2: Terra Nullius

Mabo v Queensland (No.2). [(1992) 175 CLR 1]

- Australian High Court held that previous decisions — holding that Australia was terra nullius at settlement — were wrong at law.
- the court did not decide to change the law to accommodate modern developments, in the way we see this done in fields as diverse as homicide (including a new defence for ‘battered wives’) or tax (making modern-day tax evasion illegal) or discrimination law (adding age or sexual-preference as grounds for anti-discrimination suits).

Terra Nullius

- The court went back to the basic terra nullius formulation at the time of white settlement, and concluded that previous courts were wrong according to the law at the time.
- Notwithstanding prior cases to this effect, the High Court said that Australia could not have been an empty land at settlement, since the Aboriginal presence meant that, at the law of the time, it was a colonised country.
- Aboriginal law had thus remained in force for the 200 years that the white courts had declared that it never existed.

History of Voting Rights...

- White males who own land or taxable wealth
- White males
- African Americans (1870)
- Women (1920)
- Persons 18 years of age or older (1971)

Racism and Slavery

<https://www.youtube.com/watch?v=Lj46IfpBUIY>

Science and Racism

- Carl Linnaeus
- *On the different races of man* by Kant
- Samuel Cartwright (1851): Black slaves fleeing captivity is a mental illness
- Dudley Kidd: *The Essential Kafir* (1904)
- US immigration act of 1924
- Nazi Germany
- *The Bell Curve*: Herrnstein & Murray (1994)

Seven criteria of *self*

(from *Tell tale brain* by V S Ramachandran)

- Unity
- Continuity
- Embodiment
- Privacy
- Social embedding
- Free will
- Self awareness

Collective consciousness

- Termite mounds: show planning, intention, structure, intelligence...
- Where is it?
- An abstract concept might be posited to which we can attach these attributes
- Collective consciousness *a la* Jung
- Human consciousness might be the same



So what is consciousness?

- It is not a particular feature or a cognitive ability
- It is an operational concept we have coined to refer to certain behavioral aspects of humans
- So to extend it to animals, and to robots, one has to decide which behavioral aspects are crucial

Can animals and robots have consciousness?

Once the behavioral aspects underlying consciousness are decided,

- It becomes a matter of empirical investigation whether certain animal can be considered to have consciousness
- It becomes a matter of engineering design to figure out how to create robots that exhibit conscious behavior.

Some references

- *Tell tale brain* by V S Ramachandran
- *Why red doesn't sound like a bell* by Kevin O'Regan