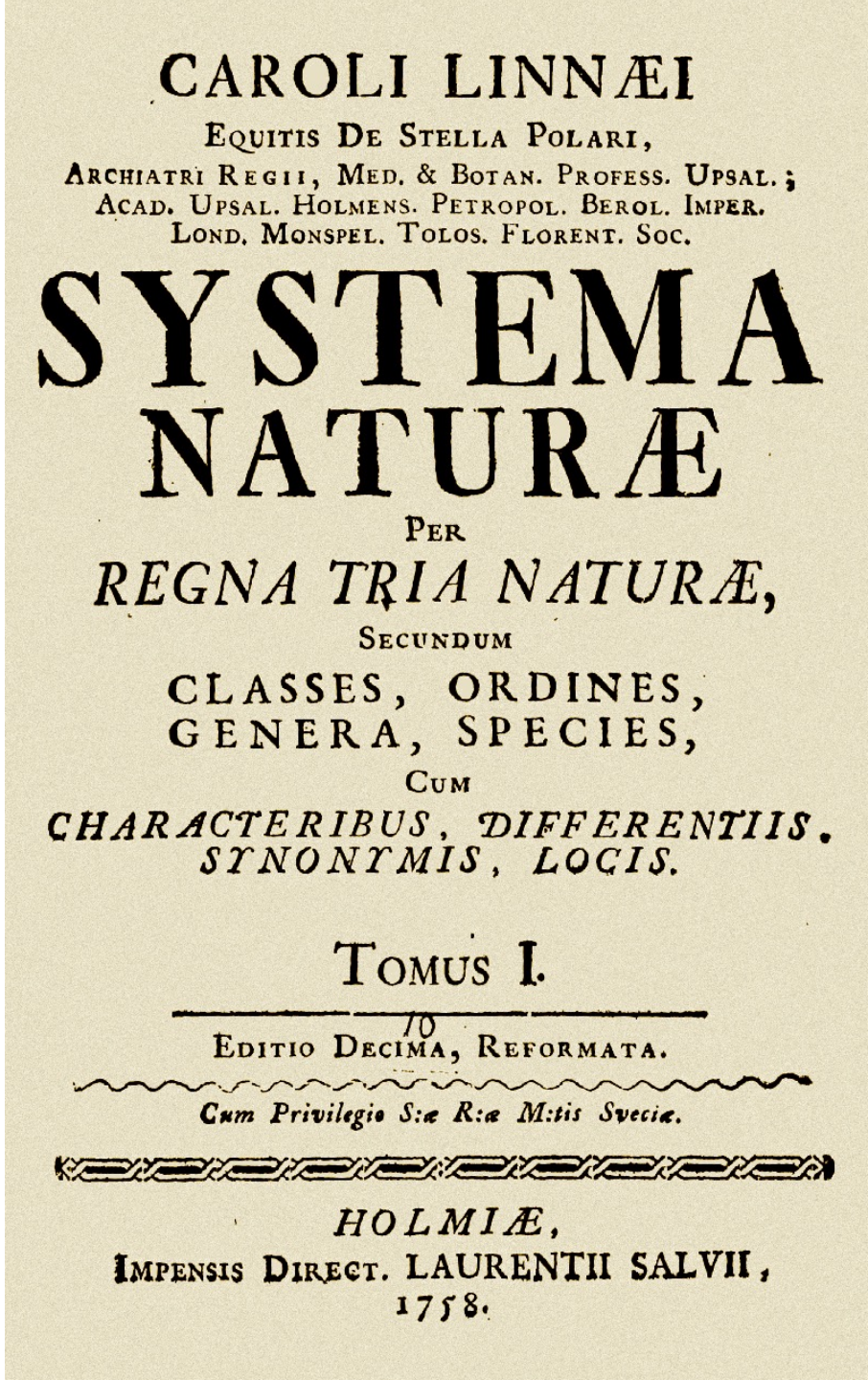
Natural Kinds, Human Kinds, and Classification

Tuomas Vesterinen, 7.3.2023



CAROLI LINNÆI

EQUITIS DE STELLA POLARI,

ARCHIATRI REGII, MED. & BOTAN. PROFESS. UPSAL.;
ACAD. UPSAL. HOLMENS. PETROPOL. BEROL. IMPER.
LOND. MONSPEL. TOLOS. FLORENT. SOC.

SYSTEMA NATURÆ

PER

REGNA TRIA NATURÆ,

SECUNDUM

CLASSES, ORDINES,
GENERA, SPECIES,

CUM

CHARACTERIBUS, DIFFERENTIIS.
SYNONYMIS, LOCIS.

TOMUS I.

10

EDITIO DECIMA, REFORMATA.

Cum Privilegio S:æ R:æ M:tis Sveciæ.

HOLMIÆ,

IMPENSIS DIRECT. LAURENTII SALVII,
1758.

Overview

1. Recap on Kuhan & Relativism
2. Classification, Realism and Natural Kinds
3. Human/Social Kinds and the Looping Effect

Recap: Kuhn

- E.g. Copernican revolution
- E.g. “Melancholia” and “depression” are not co-extensive, which makes direct comparisons between their respective conceptions and explanations difficult.
- In art: modern vs. postmodern art (Brian McHale); institutional view of art (G. Dickien)
- Technological revolutions: overhaul of what is appreciated and ability to provide better solutions (not to solve puzzles) (Niiniluoto: Tekniikan filosofia)

- Strong program of science, postmodern approaches & Science war
- Alan Shokal case 1996
- Bruno Latour: Truth is socially constructed?

KUHN, INSTRUMENTALISM, REALISM

- Incommensurability seamed to lead to relativism: truth plays no role in scientific progress
- (Most) Logical positivists were instrumentalists: they believed that theories had meaning only as discriptions of observable things
- Theory is only an instrument for organizing our observations, postulated unobservables are not real (e.g. atom, electron, subconsciousness)
- Part of the problem was that they relied on a holistic view of meaning (theory as a whole determines the reference of its terms)
- In contrast, realists argue that, for example, the aim of astronomy is truth about the movements of astronomical objects
- Realists argue that unobservable objects of research and classification are real –> natural kinds

Celestial Emporium of Benevolent Knowledge (Found by T. Kuhn)

- Animals are divided into
- *(a) belonging to the emperor, (b) embalmed, (c) tame, (d) suckling pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) quaking as though mad, (j) innumerable, (k) drawn with a very fine camel-hair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies.*

- *(Cf. "Women, Fire, and Dangerous Things: What Categories Reveal About the Mind", George Lakoff)*

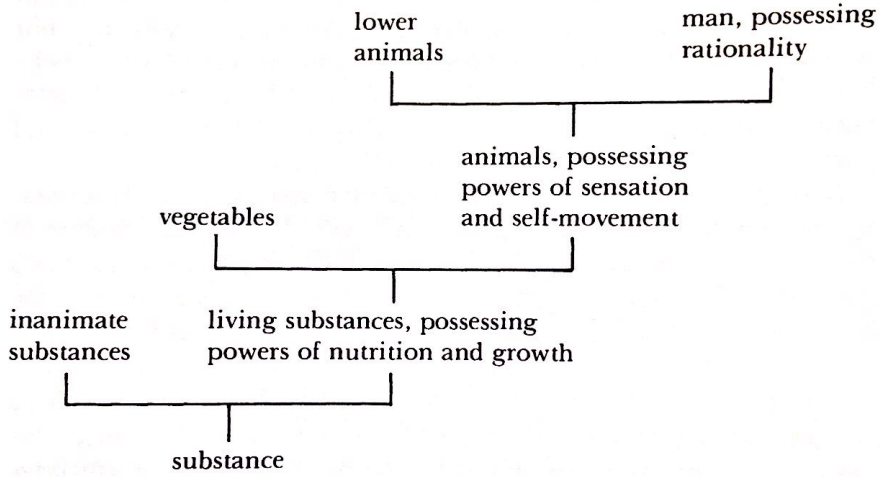
Scientific Realism and Natural Kind

- Scientific terms or concepts ideally refer to natural groupings or kinds that reflect the natural world
- Plato: “carving the nature at its joints”
- Classificatory concepts enable cognitive capacities: we can gather knowledge of the world
- Natural kinds vs. arbitrary groupings (things on my left side) or social constructs (Money? Race? Gender?)

Aristotle

- ”Scientific definition of a *species* is by *genus* and *difference*, and so the *definition of the essence* of man is ‘rational animal’. Rationality, the difference, is “the principle thing in a man’s nature,” and the properties flow from the difference “as a natural emanation”. Accidents are attributes that are not thus connected with the essence: the substance can in principle be without them even when it never is in fact, as crows are never without blackness.” (Ayers 1981)

Porphyrian tree



[3] I quote from T. Spencer: *The Art of Logic* (London, 1628; Scolar Press facsimile, Menston, 1970), ch. XI, pp. 59f.

CAROLI LINNÆI REGNUM ANIMALE.

I. QUADRUPEDIA.

Corpus hirſutum. *Pedes* quatuor. *Feminæ* viviparæ, lactiferæ.

Ordines.	Genera.	Characteres Generum.	Species.
ANTHROPOMORPHA. *Dentes* primores 4. utrinque: vel nulli.	Homo.	Noſce te ipſum.	H { Europæus albeſc. Americanus rubeſc. Aſiaticus fuſcus. Africanus nigr.
	Simia.	Anteriores. Posteriores. *Digiti* 5. . . . . 5. Poſteriores anterioribus ſimiles.	Simia cauda carens. Papio. Satyrus. Cercopithecus. Cynocephalus.
	Bradypus.	*Digiti* 3. vel 2. . . 3.	Ai. *Ignavus.* Tardigradus.
FERÆ. *Dentes primores* 6. utrinque: *intermedii* longiores: *omnes* acuti. *Pedes* multifidi, unguiculati.	Urſus.	*Digiti* 5. . . . . 5. Scandens. *Mammæ* 4. (Ald.) *Calcaneis* inſiſtit. *Pollex* extus poſitus.	Urſus. Coati *Mrg.* Wickhead *Angl.*
	Leo.	*Digiti* 5. . . . . 4. Scandens. *Mammæ* 2. ventrales. *Lingua* aculeata.	Leo.
	Tigris.	*Digiti* 5. . . . . 4. Scandens. *Mammæ* 4. umbilicales. *Lingua* aculeata.	Tigris. Panthera.
	Felis.	*Digiti* 5. . . . . 4. Scandens. *Mammæ* 8. ſc. 4. pect. 4. abdom. *Lingua* aculeata.	Felis. Catus. Lynx.
	Muſtela.	*Digiti* 5. . . . . 5. Scandens. *Dentes* molares 4. utrinque.	Martes. Zibellina. Viverra. Muſtela. Putorius.
	Didelphis.	*Digiti* 5. . . . . 5. *Mammæ* 8. intra burſulam abdomin.	Philander. *Poſſum.*
	Lutra.	*Digiti* 5. . . . . 5. Palmipes.	Lutra.
	Odobænus.	*Digiti* 5. . . . . 5. Palmipes. *Dentes* intermedii ſuperiores longiſſ.	Roſſ. *Morſus.*
	Phoca.	*Digiti* 5. . . . . 5. Palmipes. *Mammæ* duæ umbilicales.	Canis marinus.
	Hyæna.	*Digiti* 4. . . . . 4. *Collum* ſuperne jubatum. *Cauda* brevis.	Hyæna *Veter.* *Vivam Londini nuper vidit & deſcripſit* Artedi.
	Canis.	*Digiti* 5. . . . . 4. *Mammæ* 10. ſc. 4. pect. 6. abdom.	Canis. Lupus. Squillachi. Vulpes.
	Meles.	*Digiti* 5. . . . . 5. *Ungues* medii digitis ipſis longiores. *Corpus* ſuperne albicat: inferne nigricat.	Taxus. Zibetha.
	Talpa.	*Digiti* 5. . . . . 5. *anteriores* maximi.	Talpa.
	Erinaceus.	*Digiti* 5. . . . . 5. *Spinis* vel *lorica* ſquamoſa munitus.	Echinus terreſtris. Armadillo.
	Veſpertilio.	*Digiti* 5. . . . . 5. *Pes anticus* in alam expanſus. *Mammæ* 2. pectorales.	Veſpertilio. Felis volans *Seb.* Canis volans *Seb.* Glis volans *Seb.*
GLIRES. *Dentes primores* 2. utrinque. *Pedes* multifidi.	Hyſtrix.	*Aures* humanæ. *Corpus* ſpinoſum.	Hyſtrix.
	Sciurus.	*Digiti* 4. . . . . 5. *Cauda* longiſſima lanigera.	Sciurus. . . . volans.
	Caſtor.	*Digiti* 5. . . . . 5. palmipes poſtice. *Cauda* horizontalis, plana, nuda.	Fiber.
	Mus.	*Digiti* 4. . . . . 5. *Cauda* teres, ſquamoſa, hirſuta.	Rattus Mus domeſticus. . . brachiurus. . . macrourus. Lemures. Marmota.
	Lepus.	*Digiti* 5. . . . . 4. *Cauda* breviſſima, villoſa.	Lepus. Cuniculus.
	Sorex.	*Digiti* 5. . . . . 5. *Dentes canini* adſunt.	Sorex.
JUMENTA. *Dentes primores* incerti, obtuſi. *canini* exerti, validi.	Equus.	*Mammæ* 2. inguinales. *Pedes* integri.	Equus. Aſinus. Onager. Zebra.
	Hippopotamus.	*Mammæ* 2. inguinales (*Ariſt.*) *Pedes* quadrifidi.	Equus marinus.
	Elephas.	*Mammæ* 2. pectorales. *Pedes* 5. callis inſtructi.	Elephas. ? Rhinoceros.
	Sus.	*Mammæ* 10. abdominales. *Pedes* biungulati: raro ſimplices.	Sus. Aper. Porcus. Babyrouſſa. Tajacu.
PECORA. *Dentes primores* inferiores tantum: *Superiores* nulli. *Pedes* ungulati.	Camelus.	*Cornua* nulla.	Dromedarius. Bactrianus. Glama. Pacos.
	Cervus.	*Cornua* annua, primum piloſa, ſolida, ab apice creſcentia. plurimis ramoſa: feminis rara.	Camelopardalis. Caprea. Axis. Cervus. Platyceros. Rheno. *Rangifer.* Alces.
	Capra.	*Cornua* ſurſum verſa. erecta, ſcabra.	Hircus. Ibex. Rupicapra. Strepſiceros. Gazella. Tragelaphus.
	Ovis.	*Cornua* retrorſum flexa intorta, rugoſa.	Ovis vulgaris. . . Arabica. . . Africana. . . Angolenſis.
	Bos.	*Cornua* antrorſum verſa; lunulata, lævia.	Bos. Urus. Biſon. Bubalus.
Ordines.	Genera.	Characteres Generum.	Species.

II. AVES.

Corpus plumoſum. *Alæ* duæ. *Pedes* duo. *Roſtrum* oſſeum. *Feminæ* oviparæ.

Ordines.	Genera.	Characteres Generum.	Species.
ACCIPITRES. *Roſtrum* uncinatum.	Pſittacus.	*Digiti* pedis antici 2. poſtici 2.	Pſittacus.
	Strix.	*Digiti* pedis antici 3. poſticus 1. quorum extimus retrorſum flexilis.	Bubo. Otus. Noctua. Ulula.
	Falco.	*Digiti* pedis antici 3. poſticus 1.	Aquila. Vultur. Buteo. Falco. Cyanopus. Milvus. Lanius. Pygargus. Niſus. Tinnunculus.
PICÆ. *Roſtrum* ſuperne compreſſum, convexum.	Paradiſæa.	*Pennæ* 2. longiſſimæ, ſingulares, nec alis, nec uropygio infixæ.	Manucodiata. Avis Paradiſiaca.
	Coracias.	*Pes* 4dact. *Rectrices* exteriores gradatim breviores.	Pica.
	Corvus.	*Pes* 4dact. *Rectrices* æquales.	Corvus. Cornix. Monedula. Lupus. Glandaria. Caryocatactes.
	Cuculus.	*Digiti* pedis antici 2. poſtici 2. *Roſtrum* læve.	Cuculus. Torquilla ſ. Junx.
	Picus.	*Digiti* pedis antici 2. *Roſtrum* angulatum.	Picus niger. . . . viridis. . . . varius.
	Certhia.	*Pes* 4dact. *Roſtr.* gracile incurvum.	Certhia.
	Sitta.	*Pes* 4dact. *Roſtr.* triangulare.	Picus cinereus
	Upupa.	*Pes* 4dact. *Caput* plumis criſtatum.	Upupa.
	Iſpida.	*Pes* 4dact. cujus digitus extimus medio adnectitur tribus articulis.	Iſpida. Merops.
MACRORHYNCHÆ. *Roſtr.* longiſſ. acut.	Grus.	*Caput* ciliatum.	Grus.
	Ciconia.	*Ungues* plani, ſubrotundi.	Ciconia.
	Ardea.	*Unguis* medius inferne ſerratus.	Ardea.
ANSERES. *Os* dentato-ſerratum.	Platelea.	*Roſtr.* depreſſo-planum, *apice* ſubrot.	Platea.
	Pelecanus.	*Roſtr.* depreſſum, *apice* unguiculato, inferne burſa inſtructum.	Onocrotalus.
	Cygnus.	*Roſtr.* conico-convexum.	Olor. Elder. Anſer. Anſ. Bernicla.
	Anas.	*Roſtr.* conico-depreſſum.	Anas fera. Glaucium. Boſchas. *A. Domeſt.* Penelope. Querquedula.
	Mergus.	*Roſtr.* cylindriforme, *apice* adunco.	Mergus. Merganſer.
	Graculus.	*Roſtr.* conicum, *apice* adunco.	Carbo aquat. Graculus aquat.
	Colymbus.	*Roſtr.* ſubulatum. *Pedes* infra æquilibr.	Colymbus. C. minim. Podiceps. Arctica.
	Larus.	*Roſtr.* ſubulatum. *Pedes* in æquilibr.	Cataracta. Larus. Sterna. Piſcator.
SCOLOPACES. *Roſtrum* cylindraceo-tereti-uſculum.	Hæmatopus.	*Pes* 3dact. *Roſtri* apex compreſſus.	Pica marina.
	Charadrius.	*Pes* 3dact. *Roſtri* apex teres.	Pluvialis. Hiaticula.
	Vanellus.	*Pes* 4dact. *Roſtrum* digitis brevius. *Caput* pennato criſtatum.	Capella.
	Tringa.	*Pes* 4dact. *Roſtrum* digitis brevius. *Caput* ſimplex.	Tringa. Ocrophus. Pugnax. Gallinula.
	Numenius.	*Pes* 4dact. *Roſtrum* digitis longius.	Gallinago. Limoſa. Arquata. Recurviroſtra.
	Fulica.	*Pes* 4dact. *Digiti* membranis aucti. *Caput* carnoſo-criſtatum.	Gallinula aquatica.
GALLINÆ. *Roſtrum* conico-incurvum.	Struthio.	*Pes* 2dact. abſque poſtico.	Struthio-camelus.
	Caſuarius.	*Pes* 3dact. abſque poſtico. *Caput* galea & palearibus ornatum.	Emeu.
	Otis.	*Pes* 3dact. abſque poſtico. *Caput* ſimplex.	Tarda.
	Pavo.	*Pes* 4dact. *Caput* corolla pennac. orn.	Pavo.
	Meleagris.	*Pes* 4dact. *Frons* papilla. *Gula* membranâ unicâ longitudinali inſtructa.	Gallopavo.
	Gallina.	*Pes* 4dact. *Frons* membrana ſerrata. *Gula* membr. duplici longitud. inſt.	Gallina.
	Tetrao.	*Pes* 4dact. *Supercilia* papilloſa nuda.	Phaſianus. Urogallus. Tetrao. Bonaſia. Lagopus. Perdix. Coturnix.
PASSERES. *Roſtrum* conico-attenuatum.	Columba.	*Roſtr.* rectum, ad baſin furfuraceum. *Nares* oblongæ, membranula ſuperne inſtructæ.	Columba. Turtur. Palumbus. Oenas.
	Turdus.	*Roſtr.* parum convexum. *Plumæ* roſtri baſin tegunt.	Turdus. Merula.
	Sturnus.	*Roſtr.* rectum ſubteres. *Lingua* bifida cornea.	Sturnus.
	Alauda.	*Unguis* digiti poſtici digitis ipſis longior.	Alauda.
	Motacilla.	*Roſtr.* gracile. *Fauces* nigricant. *Lingua* apex bifidus laceratus.	Motacilla. Oenanthe. Merula aquatica.
	Luſcinia.	*Roſtr.* gracile rectum. *Lingua* apex bifidus laceratus.	Luſcinia. Ficedula. Erithacus. Troglodytes. Carolina *Rudb.*
	Parus.	*Roſtr.* gracile. *Lingua* apex truncatus, 4 ſetis inſtructus.	Parus. P. caudatus. . . criſtatus.
	Hirundo.	*Roſtr.* gracile, ad baſin depreſſum, minimum: *rictu* ampliſſimo.	Hirundo. Caprimulgus.
	Loxia.	*Roſtr.* craſſum, magnum, breve, curvum, undique convexum.	Coccothrauſtes. Loxia. Pyrrhula.
	Ampelis.	*Roſtr.* craſſum, rectum. *Remigum* apices nonnulli membranacei.	Garrulus Bohem.
	Fringilla.	*Roſtr.* craſſum. *Maxilla* utraque alteram ſinu quodam ad baſin recipit.	Fringilla. Carduelis. Emberiza. Spinus. Paſſer.

III. AMPHIBIA.

Corpus nudum, vel ſquamoſum. *Dentes molares* nulli: *reliqui* ſemper. *Pinnæ* nullæ.

Ordines.	Genera.	Characteres Generum.	Species.
SERPENTIA.	Teſtudo.	*Corpus* quadrupedium, caudatum, teſta munitum.	Teſtudo teſſulata. . . . terreſtris. . . . marina. Lutaria.
	Rana.	*Corpus* quadrupedium, cauda deſtitutum, ſquamis carens.	Bufo. Rana arborea. . . aquatica. . . Carolina.
	Lacerta.	*Corpus* quadrupedium, caudatum, ſquamoſum.	Crocodilus. Allegator. Cordylus. Draco volans. Scincus. Salamandra aq. . . terreſtris. Chamæleo. Seps. Senembi *Mrg.*
	Anguis.	*Corpus* apodum, teres, ſquamoſum.	Vipera. Cæcilia. Aſpis. Caudiſona. Cobras de Cabelo. Anguis Æſculapii. Cenchris. Natrix. Hydrus.

Amphibiorum Claſſem ulterius continuare noluit benignitas Creatoris; Ea enim ſi tot Generibus, quot reliquæ Animalium Claſſes comprehendunt, gauderet; vel ſi vera eſſent quæ de Draconibus, Baſiliſcis, ac ejuſmodi monſtris οἱ τερατολόγοι fabulantur, certè humanum genus terram inhabitare vix poſſet.

PARADOXA.

Hydra corpore anguino, pedibus duobus, collis ſeptem, & totidem capitibus, alarum expers, aſſervatur Hamburgi, ſimilitudinem referens Hydræ Apocalypticæ à S. Joanne Cap. xii. & xiii. deſcriptæ. Eaque tanquam veri animalis ſpeciem plurimis præbuit, ſed falſo. Natura ſibi ſemper ſimilis plura capita in uno corpore nunquam produxit naturaliter. Fraudem & artificium, cum Ipſi vidimus, dentes Ferino-muſtelini, ab Amphibiorum dentibus diverſi, facillime detexerunt.

Rana-Piscis s. Ranæ in Piscem Metamorphosis valdè paradoxa eſt, quum Natura mutationem Generis unius in aliam diverſæ Claſſis non admittat. Ranæ, ut Amphibia omnia, pulmonibus gaudent & oſſibus ſpinoſis. Piſces ſpinoſi, loco pulmonum, branchiis inſtruuntur. Ergo legi Naturæ contraria foret hæc mutatio. Si enim piſcis hic inſtructus eſt branchiis, erit diverſus à Rana & Amphibiis. Si verò pulmones, erit Lacerta: nam toto cælo à Chondropterygiis & Plagiuris differt.

Monoceros *Veterum*, corpore equino, pedibus ferinis, cornu recto, longo, ſpiraliter intorto, Pictorum figmentum eſt. Monodon *Artedi* ejuſmodi cornu gerit, cæteris verò partibus multum differt.

Pelecanus roſtro vulnus infligens femori ſuo, ut emanante ſanguine ſitim pullorum levet, fabuloſè ab Iiſdem traditur. Anſam fabulæ dedit ſaccus ſub gula pendulus.

Satyrus caudatus, hirſutus, barbatus, humanum referens corpus, geſticulationibus valde deditus, ſalaciſſimus Simiæ ſpecies eſt, ſi unquam aliquis viſus fuit. *Homines* quoque *Caudati*, de quibus recentiores peregrinatores multa narrant, ejuſdem generis ſunt.

Borometz s. Agnus Scythicus plantis accenſetur, & agno adſimilatur; cui caulis alterius plantæ è terra erumpens umbilicum intrat; idemque ſanguine præditus à feris devorari temerè dicitur. Eſt autem artificioſe ex radicibus Filicinis Americanis compoſitus. Naturaliter autem eſt *Embryo Ovis* allegoricè deſcriptus, qui omnia data habet attributa.

Phoenix, Avis ſpecies, cujus unicum in mundo individuum, & quæ decrepita ex ferali buſto, quod ſibi ex aromatibus ſtruxerat, repueraſcere fabuloſè fertur, felicem ſubitura prioris vitæ periodum. Eſt verò Palma Dactylifera. vid. *Kæmpf.*

Bernicla s. Anser Scoticus & Concha Anatifera è lignis putridis in mare abjectis naſci à Veteribus creditur. Sed fucum impoſuit *Lepas* interaneis ſuis penniformibus, & modo adhærendi, quaſi verus ille anſer *Bernicla* inde oriretur.

Draco corpore anguino, duobus pedibus, duabus alis Veſpertilionis inſtar, eſt *Lacerta alata*, vel *Raja* per artem monſtroſe ficta, & ſiccata.

Automa Mortis Horologii minimi ſonitum edens in parietibus, eſt *Pediculus pulſatorius* dictus, qui ligna perforat, eaque inhabitat.

IV PISCES.

Corpus apodum, pinnis veris inſtructum, nudum, vel ſquamoſum.

Ordines.	Genera.	Characteres Generum.	Species.
PLAGIURI. *Cauda* horizontalis.	Thrichechus.	*Dentes* in utraque maxilla. *Dorſum* impenne.	Manatus ſ. *Vacca mar.*
	Catodon.	*Dentes* in inferiore maxilla. *Dorſum* impenne.	Cot. Fiſtula in roſtro *Art.* Cete *Cluſ.*
	Monodon.	*Dens* in ſuperiore max. 1. *Dorſum* impenne.	Monoceros. *Unicornu.*
	Balæna.	*Dentes* in ſup. max. cornei. *Dorſum* ſæpius impenne.	B. Groenland. B. Finfiſch. B. Maxill. inf. latiore. *Art.*
	Delphinus.	*Dentes* in utraque maxilla. *Dorſum* pinnatum.	Orcha. Delphinus. Phocæna.
CHONDROPTERYGII. *Pinnæ* cartilagineæ.	Raja.	*Foramina* branch. utrinq. 5. *Corpus* depreſſum.	Raja clav. aſp. læv. &c. Squatino-Raja. Altavela. Paſtinaca mar. Aquila. Torpedo. Bos *Vet.*
	Squalus.	*Foram.* branch. utrinq. 5. *Corpus* oblongum.	Lamia. Galeus. Catulus. Vulpes mar. Zygæna. Squatina. Centrine. Priſtis.
	Acipenſer.	*Foram.* branch. utrinq. 1. *Os* edentul. tubulatum.	Sturio. Huſo. *Ichthyocolla.*
	Petromyzon.	*Foram.* branch. utrinq. 7. *Corpus* bipenne.	Enneophthalmus. Lampetra. Muſtela.
BRANCHIOSTEGI. *Pinnæ* oſſic. carentes. *Branch.* oſſ. & membran.	Lophius.	*Caput* magnitudine corporis. *Appendices* horizontaliter latera piſcis ambiunt.	Rana piſcatrix. Guacucuja.
	Cyclopterus.	*Pinnæ* ventrales in unicam circularem concretæ.	Lumpus. *Lepus mar.*
	Oſtracion.	*Pinnæ* ventrales nullæ. *Cutis* dura, ſæpe aculeata	Orbis div. ſp. Piſc. triangul. Atinga. Hyſtrix. Oſtracion. Lagocephalus.
	Baliſtes.	*Dentes* contigui maximi. *Aculei* aliquot robuſti in dorſo.	Guaperua. Hiſtrix. Capriſcus. *Caper.*
ACANTHOPTERYGII. *Pinnæ* oſſeæ, quarum quædam aculeatæ.	Gaſteroſteus.	*Membr. branch.* oſſiculis 3. *Venter* laminis oſſeis inſtr.	Aculeatus. Spinachia. Pungitius.
	Zeus.	*Corpus* compreſſum. *Squamæ* ſubaſperæ.	Aper. Faber. *Gallus mar.*
	Cottus.	*Membrana branch.* oſſic. 6. *Caput* aculeatum, corpore latius.	Cataphractus. Scorpio mar. Cottus. *Gobio fl. capit.*
	Trigla.	*Appendices* ad pinn. pect. articulatæ 2 vel 3.	Lyra. Gurnardus. Cuculus. Lucerna. Hirundo. Milvus. Mullus barb. & imberb.
	Trachinus.	*Opercula branch.* aculeata. *Oculi* vicini in vertice.	Draco. Araneus mar. Uranoſcopus.
	Perca.	*Memb. branch.* oſſicul. 7. *Pinnæ* dorſales. 1 vel 2.	Perca. Lucioperca. Cernua. Schraitſer.
	Sparus.	*Opercula branch.* ſquamoſa. *Labia* dentes tegunt. *Dentes* molares obtinet.	Salpa. Melanurus. Sparus. Sargus. Chromis. Mormyrus. Mæna. Smaris. Boops. Dentex. Erythrinus. Pagrus. Aurata. Cantharus.
	Labrus.	*Labia* craſſa dentes teg. *Color* ſpecioſus.	Julis. Sachettus. Turdus diverſar. ſpecier.
	Mugil.	*Memb. branch.* oſſic. 6. *Caput* totum ſquamoſum.	Mugil. *Cephalus.*
	Scomber.	*Memb. branch.* oſſic. 7. *Pinnæ dorſi* 2 vel plures.	Glaucus. Amia. Scomber. Thynnus. Trachurus. *Saurus.*
	Xiphias.	*Roſtrum* apice enſiformi. *Pinnæ ventrales* nullæ.	Gladius.
	Gobius.	*Pinnæ vent.* in 1 ſimpl. concr. *Squamæ* aſperæ.	Gob. niger. Jozo. Paganellus. *Aphua.*
MALACOPTERYGII. *Pinnæ* oſſeæ, quæ omnes molles.	Gymnotus.	*Membr. branch.* oſſicul. 5. *Pinna* dorſalis nulla.	Carapo.
	Muræna.	*Membr. branch.* oſſic. 10. *Tubuli* in apice roſtri. 2.	Anguilla. Conger. Fluta. Serpens mar.
	Blennus.	*Pinnæ ventr.* conſtant oſſ. 2. *Caput* admodum declive.	Alauda non criſt. & galer. Blennus. Gattorugine.
	Gadus.	*Membr. branch.* oſſic. 7. *Pinnæ* dorſi. 2 vel 3.	Aſellus diverſar. ſpecier. Merluccius. Anthias 2dus. Muſtela. Egrefinus.
	Pleuronectes.	*Membr. branch.* oſſ. 6. *Oculi* ambo in eodem later.	Rhombus diverſ. ſpecier. Paſſer. Limanda. Hippogloſſus. Bugloſſ. Solea.
	Ammodytes.	*Membr. branch.* oſſic. 7. *Pinnæ* ventr. nullæ.	Ammodytes. *Tobianus.*
	Coryphæna.	*Membr. branch.* oſſic. 5. *Pinna* dorſi à capite ad caudam.	Hippurus. Pompilus. Novacula. *Peſten.*
	Echeneis.	*Striæ* tranſverſæ, aſperæ, in ſuperna capitis parte.	Remora.
	Eſox.	*Membr. branch.* oſſic. 14.	Lucius. Belone. Acus maxima ſquamoſa.
	Salmo.	*Membr. branch.* oſſic. 10-12. *Corpus* maculoſum.	Salmo. Trutta. Umbla. Carpio lacuſtr.
	Oſmerus.	*Membr. branch.* oſſic. 7--8. *Dentes* in max. lingu. palat.	Eperlanus. *Spirinchus.* Saurus.
	Coregonus.	*Membr. branch.* oſſic. 8--10. *Appendix* pinniformis.	Albula. *Lavaretus.* Thymallus. Oxyrhynchus.
	Clupea.	*Membr. branch.* oſſic. 8. *Venter* acutus ſerratus.	Harengus. Spratti. Encraſicholus. Aloſa.
	Cyprinus.	*Membr. branch.* oſſic. 3. *Dentes* ad orificium ventriculi tantum.	Erythrophthal. Mugil. fluv. Brama. Ballerus. Capito. Naſus. A. M. Caraſſius. Cypr. nobilis. Tinca. Barbus. Rutilus. Alburnus. Leuciſcus. Phoxinus. Gobius fl.
	Cobitus.	*Caput* compreſſum. *Pinnæ* dorſi & ventrales eâdem à roſtro diſtantia.	Cobitis. Barbatula. Miſgurn.
	Syngnathus.	*Opercula branch.* ex lamina 1. *Maxilla* à lateribus clauſæ.	Acus lumbr. Acus *Ariſtot.* Hippocampus.

V. INSECTA.

Corpus cruſta oſſea cutis loco tectum. *Caput* antennis inſtructum.

Ordines.	Genera.	Characteres Generum.	Species.
COLEOPTERA. *Alæ* elytris duobus tectæ.	Blatta.	§. Facie externa facile disting. *Elytra* concreta. *Alæ* nullæ. *Antennæ* truncatæ.	Scarab. tardipes. Blatta fœtida.
	Dytiſcus.	*Pedes* poſtici remorum forma & uſu. *Ant.* ſetaceæ. *Sterni* apex bifurcus.	Hydrocantharus. Scarab. aquaticus.
	Meloë.	*Elytra* mollia, flexilia, corpore breviora. *Ant.* moniliformes. *Ex* articulis oleum fundens.	Scarab. majalis. Scarab. unctuoſus.
	Forficula.	*Elytra* breviſſima, rigida. *Cauda* bifurca.	Staphylinus. Auricularia.
	Notopeda.	Poſitum in dorſo exſilit. *Ant.* capillaceæ.	Scarab. elaſticus.
	Mordella.	*Cauda* aculeo rigido ſimplici armata. *Ant.* ſetaceæ, breves.	Negatur ab *Ariſtotele.*
	Curculio.	*Roſtrum* productum, teres, ſimplex. *Ant.* clavatæ in medio Roſtri poſitæ.	Curculio.
	Buceros.	*Cornu* 1. ſimplex, rigidum, fixum. *Ant.* capitatæ, foliaceæ.	Rhinoceros. Scarab. monoceros.
	Lucanus.	*Cornua* 2. ramoſa, rigida, mobilia. *Ant.* capitatæ, foliaceæ.	Cervus volans.
	Scarabæus.	§. Antennæ truncatæ. *Ant.* clavatæ foliaceæ. *Cornua* nulla.	Scarab. pilularis. Melolontha. Dermeſtes.
	Dermeſtes.	*Ant.* clavatæ horizontaliter perfoliatæ. *Clypeus* planiuſculus, emarginatus.	Cantharus faſciatus.
	Caſſida.	*Ant.* clavato-ſubulatæ. *Clypeus* planus, antice rotundatus.	Scarab. clypeatus.
	Chryſomela.	*Ant.* ſimplices, clypeo longiores. *Corpus* ſubrotundum.	Cantharellus.
	Coccionella.	*Ant.* ſimplices, breviſſimæ. *Corpus* hemiſphæricum.	Cochinella vulg.
	Gyrinus.	*Ant.* ſimplices. *Corpus* breve. *Pedibus* poſticis ſaliens.	Pulex aquaticus. Pulex plantarum.
	Necydalis.	*Ant.* clavato-productæ. *Clypeus* anguſtus, rotundatus.	Scarabæo-formica.
	Attalabus.	*Ant.* ſimplices, constructæ articulis orbicularibus, præter ultim. globoſum.	Scarab. pratenſis.
	Cantharis.	§. Antennæ Setaceæ. *Clypeus* planus, margine undique promin. *Elytra* flexilia.	Cantharis *offic.*
	Carabus.	*Clypeus* fere planus, marg. prominente. *Elytra* fragilia.	Cantharus fœtidus. Cantharellus auratus.
	Cicindela.	*Clypeus* cylindraceus vel teres. *Forceps* oris prominens.	Cantharus Marianus.
	Leptura.	*Clypeus* ſubrotundus. *Pedes* longi. *Corpus* tenue acuminatum.	Scarab. tenuis.
	Cerambyx.	*Clypeus* ad latera mucrone prominet. *Ant.* corpus longitudine æquant, vel ſuperant.	Capricornus.
	Bupreſtis.	*Clypeus* ſuperne 2 punctis elevatis notatus.	Scarab. ſylvaticus.
ANGIOPTERA. *Alæ* omnibus datæ, elytris deſtitutæ.	Papilio.	*Roſtrum* ſpirale. *Alæ* 4.	Papilio alis erectis. Pſyche--- planis. Phalæna-- compreſſis.
	Libellula.	*Cauda* folioſa. *Alæ* 4. expanſæ.	Perla. Virguncula.
	Ephemera.	*Cauda* ſetoſa. *Alæ* 4. erectæ.	Muſca Ephemera.
	Hemerobius.	*Cauda* ſetoſa. *Alæ* 4. compreſſæ.	Phryganea.
	Panorpa.	*Cauda* cheliformis. *Alæ* 4. *Roſtr.* corn.	Muſca ſcorpiurus.
	Raphidia.	*Cauda* ſpinoſo-ſetacea. *Alæ* 4. *Cap.* corn.	*Non deſcripta.*
	Apis.	*Cauda* aculeo ſimplici. *Alæ* 4.	Crabro. Veſpa. Bombylius. Apis.
	Ichneumon.	*Cauda* aculeo partito. *Alæ* 4.	Ichneumon. Muſca tripilis.
	Muſca.	*Stylus* ſub alis capitatus. *Alæ* 2.	Muſcæ div. ſpec. Oeſtrum *Vet.* Oeſtrum *Lapponum.* Tabanus. Culex. Teredo nav. Tipula. Formica-leo.
HEMIPTERA. *Alæ* elytris deſtitutæ, Quibuſdam tantum individuis conceſſæ.	Gryllus.	*Pedes* 6. *Alæ* 4. *ſuperiores* craſſiores.	Gryllus domeſticus. Gryllo-talpa. Locuſta. Mantis.
	Lampyris.	*Pedes* 6. *Clypeus* planus. *Alæ* 4.	Cicindela.
	Formica.	*Pedes* 6. *Alæ* 4. *Cauda* aculeum condit.	Formica.
	Cimex.	*Pedes* 6. *Alæ* 4. cruciferæ. *Roſtrum* ſtyliforme, rectum.	Cimex lectularius. Orſodachne. Tipula aquatica. Bruchus.
	Notonecta.	*Pedes* 6. quorum *poſtici* remorum figura & uſu. *Alæ* 4. cruciferæ.	Notonecta aquatica.
	Nepa.	*Pedes* 4. *Frons* chelifera. *Al.* 4. crucif.	Scorpio aquat.
	Scorpio.	*Pedes* 8. *Frons* chelifera, aculeata. *Alæ* 4. laxæ.	Scorpio terreſtris.
APTERA. *Alæ* nullæ.	Pediculus.	*Pedes* 6. *Antennæ* capite breviores.	Pediculus humanus. Ped. avium. Ped. piſcium. Ped. pulſatorius.
	Pulex.	*Pedes* 6. ſaltatrices.	Pulex vulgaris.
	Monoculus.	*Pes* 1.? *Antennæ* bifidæ.	Pulex arboreſc. *Swam.* *Monoculus Bradl.* *Apus Friſch.*
	Acarus.	*Pedes* 8. articulis 8 conſtantes. *Oculi* 2. *Ant.* minimæ.	Ricinus. Scorpio-araneus. Pedic. inguinalis. Pedic. Scarabæi. Pedic. Scabiei. Araneus coccineus.
	Araneus.	*Pedes* 8. *Oculi* communiter 8.	Araneus. Tarantula. Phalangium.
	Cancer.	*Pedes* 12. *priores* cheliformes.	Cancer. Aſtacus. Pagurus. Squilla. Majas. Eremita. Gammarus.
	Oniſcus.	*Pedes* 14.	Aſellus *Offcin.* Aſellus aquat.
	Scolopendria.	*Pedes* 20. & ultra.	Scolop. terreſtris. Scolop. marina. Julus.

VI. VERMES.

Corporis *Muſculi* ab una parte baſi cuidam ſolidæ affixi.

Ordines.	Genera.	Characteres Generum.	Species.
REPTILIA. Nuda, artubus deſtituta.	Gordius.	*Corpus* filiforme, teres, ſimplex.	Seta aquatica. Vena Medina.
	Tænia.	*Corpus* faſciatum, planum, articulatum.	Lumbricus longus.
	Lumbricus.	*Corpus* teres, annulo prominenti cinctum.	Inteſtinum terræ. Lumbricus latus. Aſcaris.
	Hirudo.	*Corpus* inferne planum, ſuperne convex. tentaculis deſtitutum.	Sanguiſuga.
	Limax.	*Corpus* inferne planum, ſuperne conv. tentaculis inſtructum.	Limax.
TESTACEA. Habitaculo Lapideo inſtructa.	Cochlea.	*Teſta* univalvis, ſpiralis, unilocularis.	Helix. Labyrinthus. Voluta. Cochlea varia. Buccinum. Lyra. Turbo. Caſſida. Strombus. Fiſtula. Terebellum. Murex. Purpura. Aporrhais. Nerita. Trochus.
	Nautilus.	*Teſta* univalvis, ſpiralis, multilocularis.	Nautilus. Orthoceros. Lituus.
	Cypræa.	*Teſta* univalvis, convoluta, rima longitudinali.	Concha Veneris. Porcellana.
	Haliotis.	*Teſta* univalvis, patula, leviter concava, perforata, ad angulum ſpiralis.	Auris marina.
	Patella.	*Teſta* univalvis, concava, ſimplex.	Patella.
	Dentalium.	*Teſta* univalvis, teres, ſimplex.	Dentalium. Entalium. Tubus vermicul.
	Concha.	*Teſta* bivalvis.	Mytulus. Vulva marina. Pholas. Bucardium. Perna. Chama. Solenes. Tellina. Pinna. Oſtrea. Pecten. Mitella. *Vomer.*
	Lepas.	*Teſta* multivalvis. *Valvulæ* duabus plures.	Concha anatifera. Verruca teſtudin. Balanus marinus.
ZOOPHYTA. Artubus donata.	Tethys.	*Corpus* forma variabile, molle, nudum.	Tethys. Holothurium. Penna marina.
	Echinus.	*Corpus* ſubrotundum, teſta tectum, aculeis armatum.	Echinus marinus.
	Aſterias.	*Corpus* radiatum, corio tectum, ſcabrum.	Stella marina. Stella oligantis. St. pentactinoides. St. polyſactinoid.
	Meduſa.	*Corpus* orbiculatum, gelatinoſum, ſubtus filamentoſum.	Urtica marina. Urt. vermiformis. Urt. crinita. Urt. aſtrophyta.
	Sepia.	*Corpus* oblongum, interne oſſeum, anterius octo artubus donatum.	Sepia. Loligo.
	Microcoſmus.	*Corpus* variis heterogeneis tectum.	Microcoſm. marin.

John Locke

- Mechanistic philosophy: “all differences are differences of degree, and everything is in principle indefinitely mutable.. Differences in spatial quantity and ordering and motion of the parts of things.. How we rank them is a matter to be more or less pragmatically determined.”
- Nominal essence: the boundary is precise because we draw it, nature does not supply it. We have no access to the real essence.

Birth of the “natural kind”

- William Whewell (1794-1866): *Kinds* are the groups that we refer to with our general terms.
- John Stuart Mill: *finite kinds* and *real kinds*
  - *Finite kinds*: Have only one thing in common. E.g. all green things, all the things on my left side.
  - *Real kinds*: Enable inductive inferences due to shared similarities. E.g. Tigers, chemical elements, planets.
- Charles Peirce: Laws of nature hold natural kinds together

Natural kind semantics

- Logical empiricism & descriptivism (Frege and Russell)
  - Each term is associated with a description (or a bundle of descriptions) that determine its reference
- Kuhn & Feyerabend: When descriptions in different theories are contradictory they are not talking about the same thing -> incommensurable
  - Therefore, there is no growth of knowledge about the thing
- Scientific realism & causal theory of reference (Kripke and Putnam)
  - Theoretical terms refer to unobservable real kinds
  - Descriptions do not determine reference
  - Reference is fixed by ostension or description whence its use is passed along in a causal-historical chain.
  - Scientists can have contradictory beliefs about the same thing

Essentialism and Naturalism about natural kinds

- *Essentialist* approach defines kinds as natural based on shared necessary and sufficient conditions that are determined by, for instance, microstructure, nature or intrinsic properties
- Essentialist usually argue that natural kinds are upheld by laws of nature (e.g. Peirce, Kripke 1980, Putnam 1975, Ellis 2001).
- *Naturalists* defend natural kinds from an epistemic point of view. They stress how natural kinds ground inductive inferences, explanations, and predictions (Mill 1843, Boyd 1989, Millikan 1999, Dupré 1993).

Questions

- What role does classification play in your field?
- Are there kinds in your discipline? Are they natural?

Classifying Humans and Human Kinds

- Are classifications in the human scieces different? Are their targets different, humans and social objects?
- Naturalism: supports inductive inferences
- Are they mind dependent? Three types of social kinds (Khalidi).
  - Recession
  - Money, coctail parties, wars (When does a brawl turn into a war? E.g. the foodball war of Hoduras vs. El Salvador)
  - Perminant recident

Dynamic Nominalism (Ian Hacking)

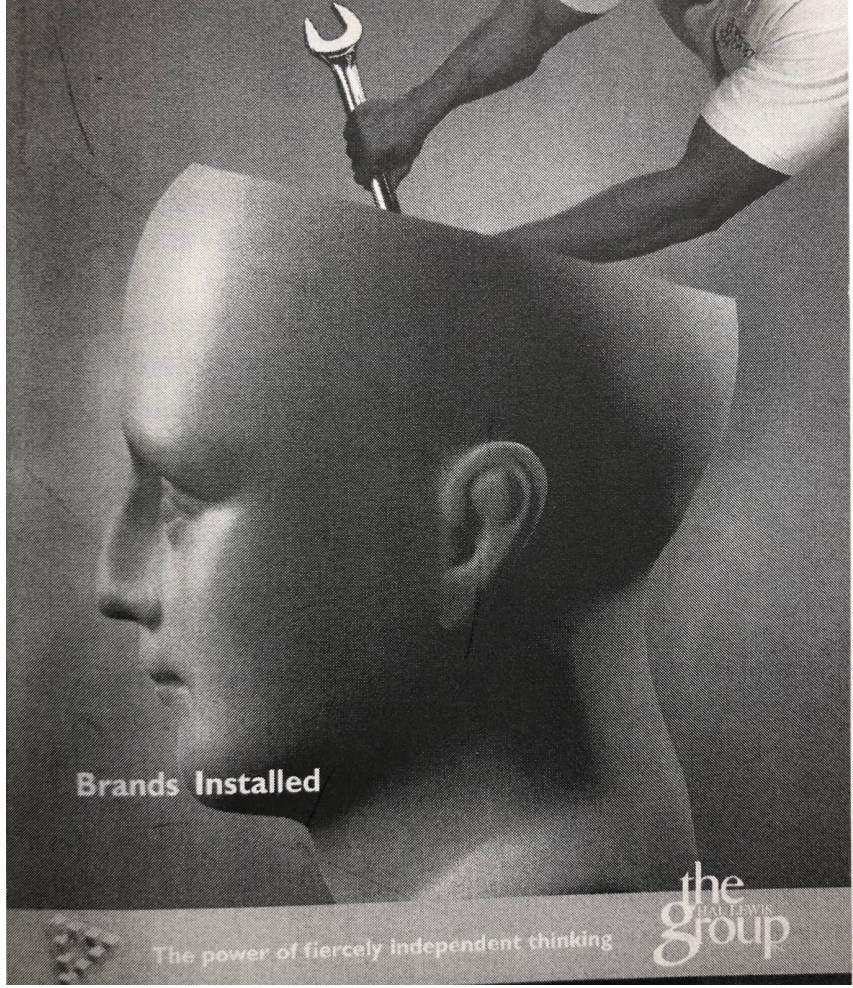
- Classification as a process of co-fitting our concepts and the world
- But the social world does not offer natural restrictions for different ways of classifying and intervening
- Whereas quarks are stable objects of study, ”kinds of people” have a historical ontology contingent on their classifications
- ”Perhaps the fundamental difference between the natural and social sciences is that the natural sciences investigate indifferent kinds, while the social sciences are on the whole concerned with interactive kinds.” (Hacking 1997)
- Source of Instability: classification changes the very attributes used in the classification (Hacking 1993: 304)

Interactive kinds and indifferent kinds

- Human kinds are ”kinds of people” defined by their behaviour, actions and tendencies (1995) (Later interactive kinds to incorporate agency 1997)
  - Fugue, multiple personality disorder, schizophrenia
  - Teen-age pregnancy, child abuse, and homosexuality
- Value-laden groups of humans that motivate reactions
- Hacking concentrates on the “abnormal” but also valued classifications, e.g. “genius” for romantics (Hacking 1997).

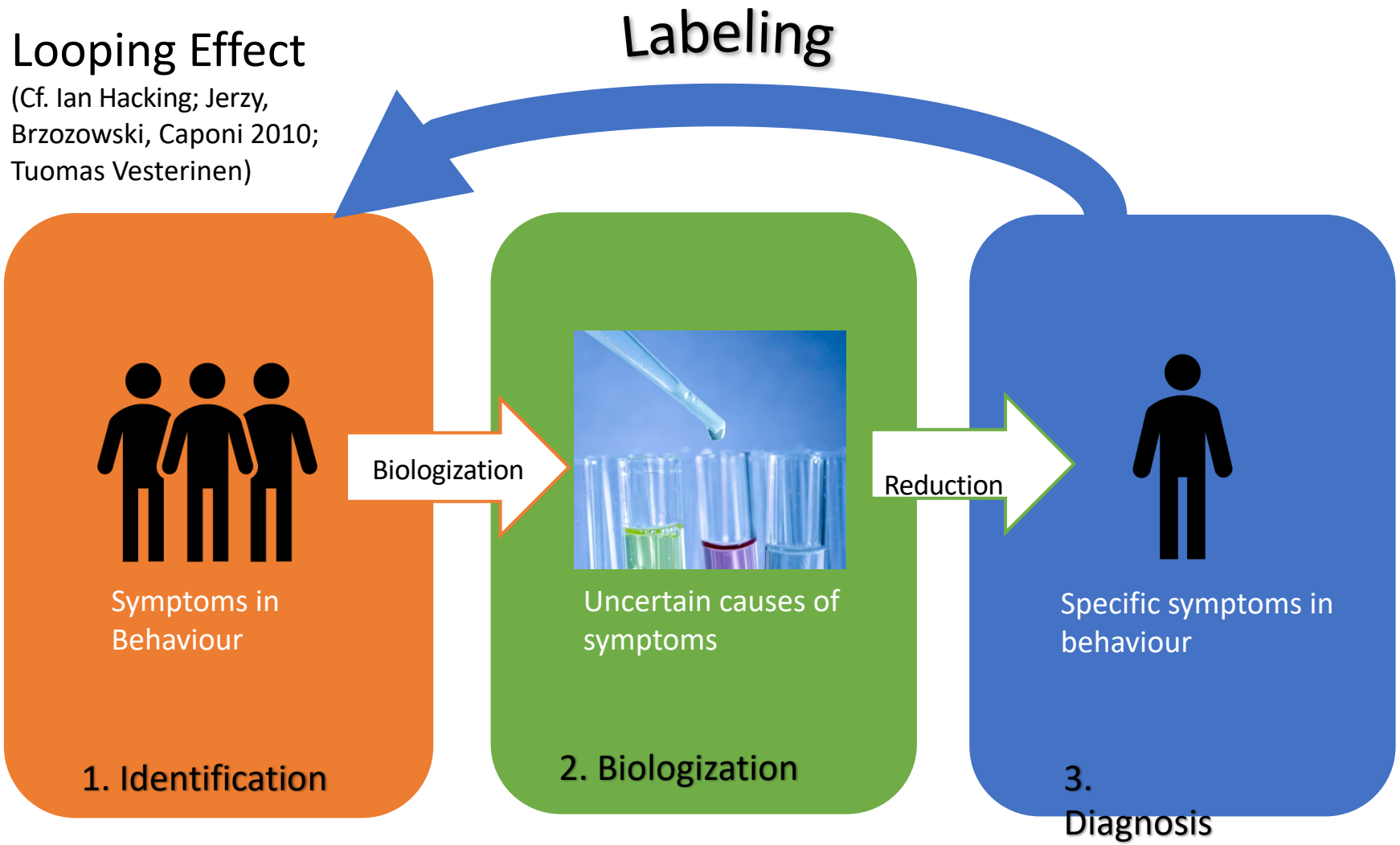
The looping effect

- **Classification ”changes** the space of possibilities for personhood”
- ***The Loop*:** Classifications and the people being classified interact with one another
- First stage: Classification, associated beliefs, and the generated actions influence the people being classified (and others around them)
- Second stage: Classification may have to be amended to match the changes
- ***The Effect*:** Destabilizes the kind by rendering it a “moving target”

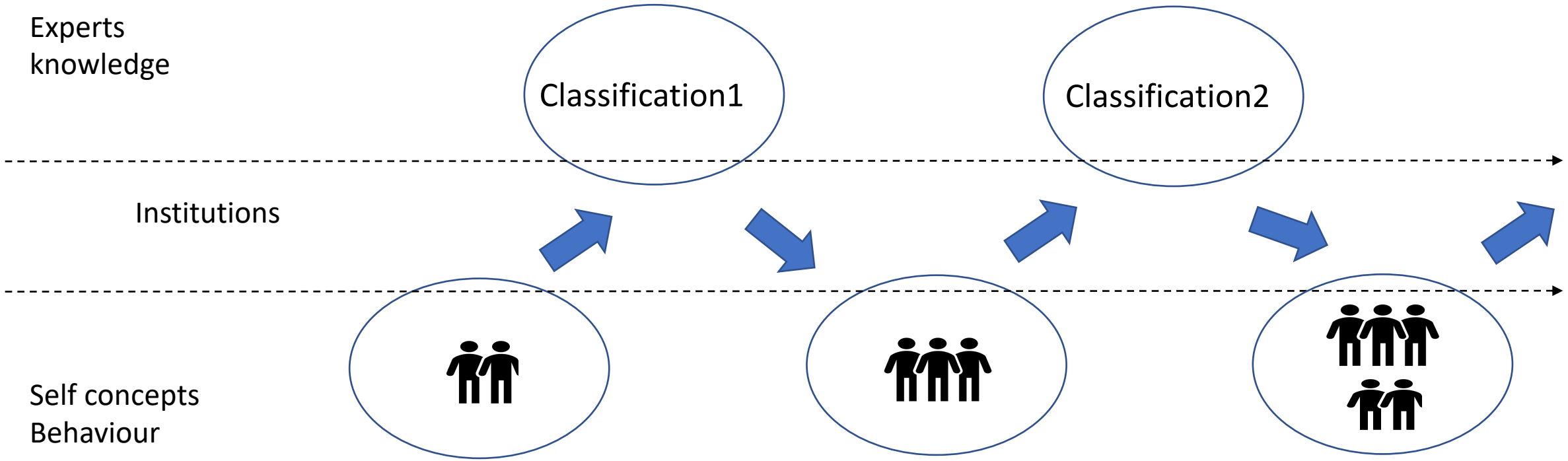


Looping Effect

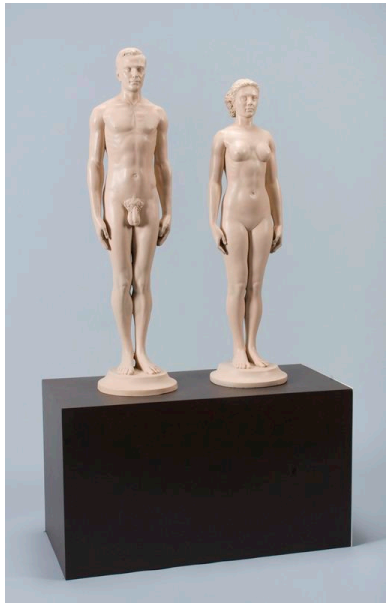
(Cf. Ian Hacking; Jerzy, Brzozowski, Caponi 2010; Tuomas Vesterinen)



Human Kinds as moving targets

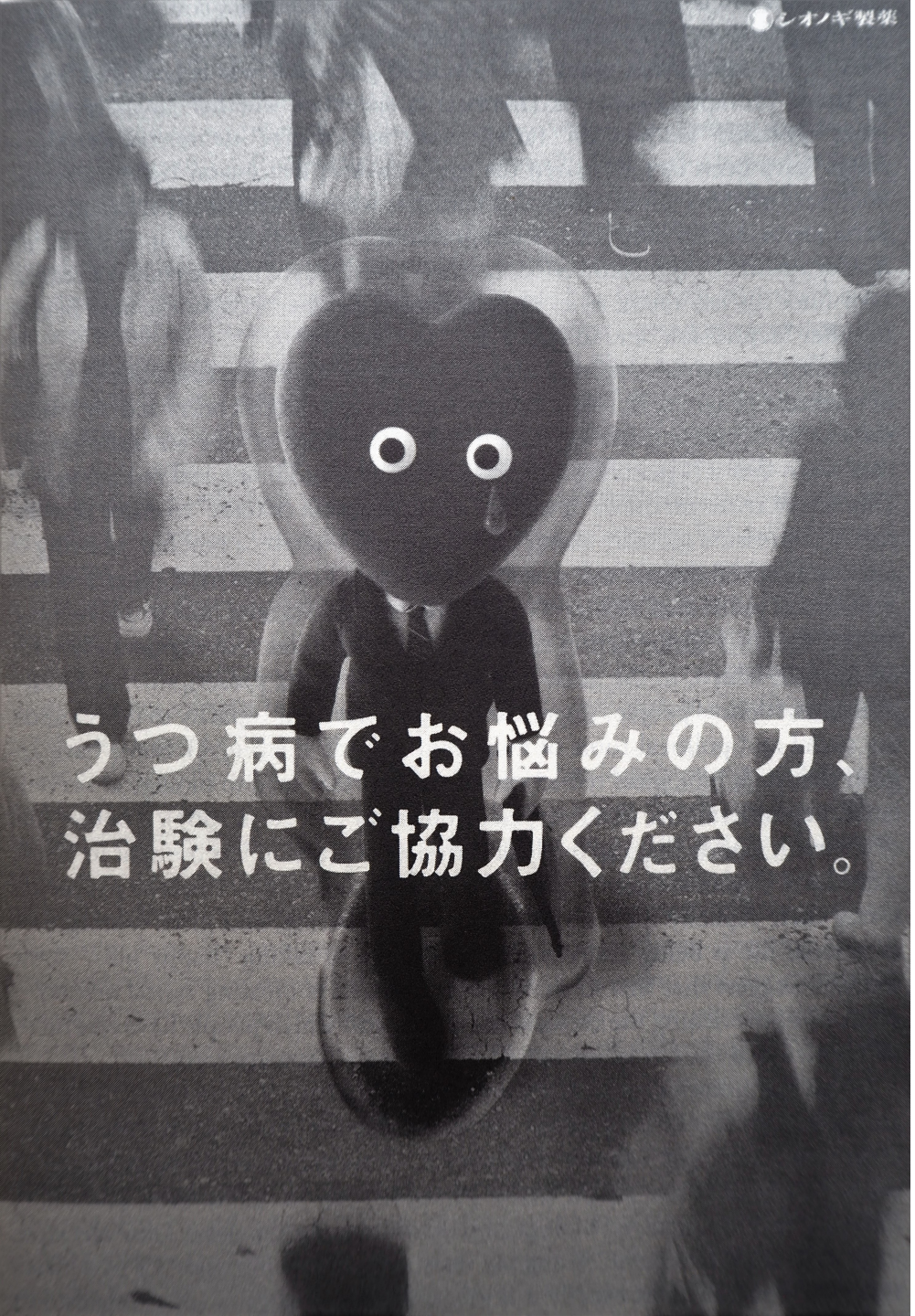


Psychiatric kinds as examples



Norm and Norma 1945

- When symptoms appear somewhere they may need to be considered as symptoms of a disorders to cluster
- May lack the required “conceptual space” for a suffering person: the conception of the normal way to be abnormal
- Individual has to recognize and interpret her feelings and behaviour as kind-typical and learn the proper reaction
- Interactive kind is not just a bundle of symptoms, but a kind of person
- For example, when Asperger’s was included in 1994, it was thought to be really rare -> turned out to be common



Culture influences mental problems

- E.g. Voice hallucination in the USA, Ghana and India; Depression in Japan
- Latah in South-East Asia
- Taijin Kyofusho: social phobia, ashamed for their bodily functions and appearance.
- Hikikomori: withdrawal from all social contacts
- Mild depression in Japan

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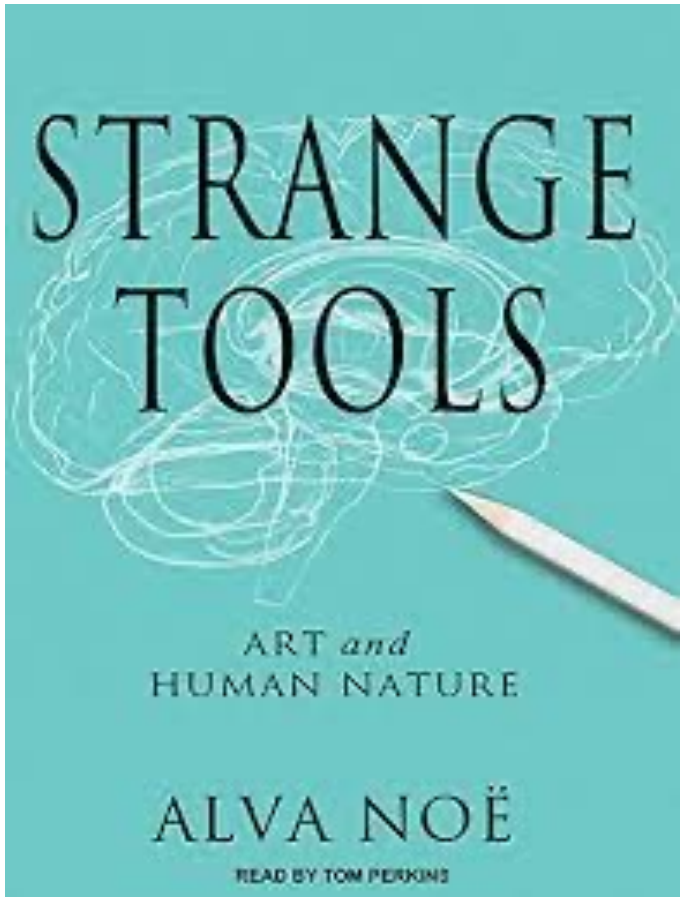
Strange Tools (Alva Noë, 2015)

- Hacking (1999: 34) “Looping effects are everywhere. Think what the category of genius did to those Romantics who saw themselves as geniuses, and what their behavior in turn did to the category of genus itself. Think about the transformations effected by the notions of fat, overweight, anorexic.”
- Art and technology do not only model, and describe yourself, feelings etc, but hey change the ways we are organized, provide novel resources for thinking and doing things differently. They alter the way we see ourselves and reorganize our practices.
- Artifact kinds are subject to looping?
- E.g. the developent of music instruments interacted with people, concepts, culture, craft-techniques and materials.



Are there looping effects in your discipine?

- Can you think of a looping effect in science, design, technology, architecture?
- For instance, “When I do my practice-led research in a field of craft, should I clarify to myself how my ontological thinking is linked to the idea of natural kinds? Glass-blowing process (social kind) and the material kind.”