Title: Does electronic communication make any difference to the nature of expertise?

Date: Sep 10, 2008 10:00 AM

URL: http://pirsa.org/08090033

Abstract: I introduce `The Periodic Table of Expertises\' (Collins and Evans 2007). The classification is driven by the idea of tacit knowledge. Its most important division is between the expertise of those who have acquired tacit knowledge pertaining to a specialism as a result of social interaction with the relevant specialist community and those who use only `ubiquitous tacit knowledge\' to acquire specialist `information\' through their reading. I ask whether electronic communication blurs this dividing line; it does enable a huge increase in access to information. I conclude that electronic communication makes no profound difference but I try to explain why it might be thought to change things. Electronic communication can be understood only if we also understand the prior social relationships of those using electronic media.

CARDIFF UNIVERSITY UK
Cardiff School of Social Sciences

Centre for the Study of
KNOWLEDGE
EXPERTISE
SCIENCE

KES

Structure of talk

Structure of talk

PART 1: (*slides 4-26*) Introduction to Studies of Expertise and Experience (SEE) and the Periodic Table of Expertises

PART 2: (*slides 28-37*) New analysis of tacit knowledge (and a note on artificial intelligence)

Structure of talk

PART 1: (*slides 4-26*) Introduction to Studies of Expertise and Experience (SEE) and the Periodic Table of Expertises

PART 2: (*slides 28-37*) New analysis of tacit knowledge (and a note on artificial intelligence)

PART 3: (*slide 39-40*) What difference does the internet make?

PART 1

Introduction to Studies of Expertise and Experience (SEE) and the Periodic Table of Expertises

Origins of This Programme of Research

Origins of This Programme of Research

1) Worries about how to limit the tendency to resolve technological disputes in the public domain by passing more and more responsibility to a `wise public' (the folk wisdom view)

Origins of This Programme of Research

1) Worries about how to limit the tendency to resolve technological disputes in the public domain by passing more and more responsibility to a `wise public' (the folk wisdom view)
2) Puzzlement about the nature of the expertise of a sociologist doing fieldwork with physicists – gave rise to the idea of `interactional expertise'

Origins of This Programme of Research

1) Worries about how to limit the tendency to resolve technological disputes in the public domain by passing more and more responsibility to a `wise public' (the folk wisdom view)
2) Puzzlement about the nature of the expertise of a sociologist doing fieldwork with physicists – gave rise to the idea of `interactional expertise'

Notorious paper in 2002 – *The Third Wave of Science Studies*

Harry Collins and Robert Evans

Rethinking Expertise

University of Chicago Press

2007

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES					
DISPOSITIONS				Interactive Ability	Reflective Ability
SPECIALIST	***UBIQUITOUS TACIT KNOWLEDGE***			***SPECIALIST TACIT KNOWLEDGE***	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise
				Polimorphic	*Mimeomorphic*

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES						
DISPOSITIONS				Interactive Ability / Reflective Ability		
SPECIALIST EXPERTISES	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*		
	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise	
				Polimorphic / *Mimeomorphic*		
META-EXPERTISES	*EXTERNAL*		*INTERNAL*			
	Ubiquitous Discrimination	Local Discrimination	Technical Connoisseurship	Downward Discrimination	Referred Expertise	

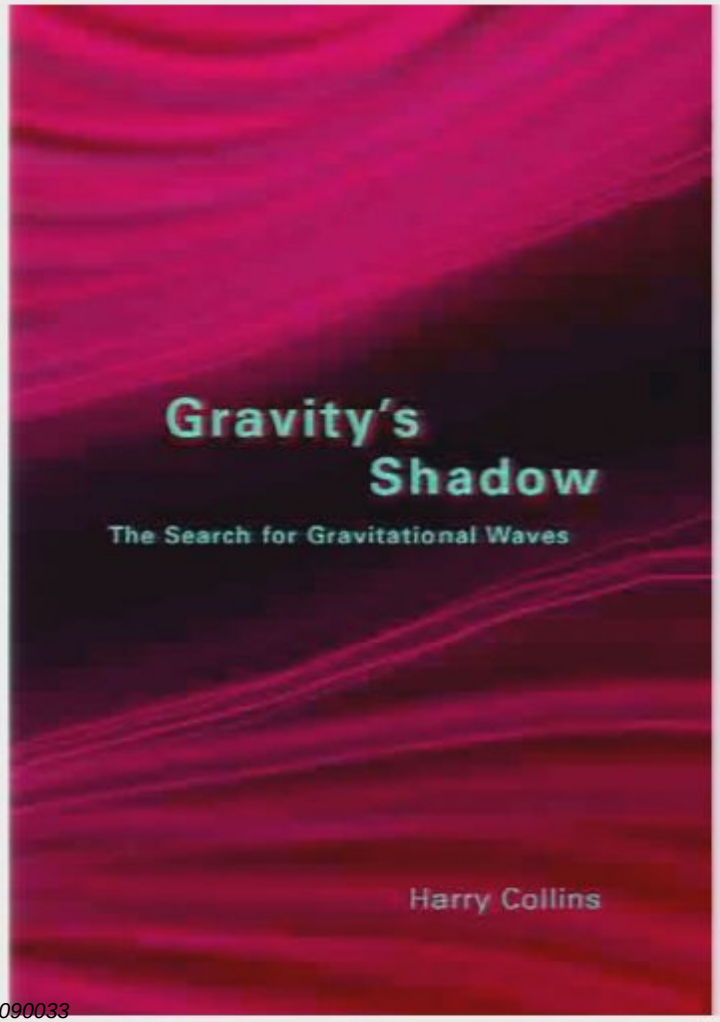
Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES						
DISPOSITIONS				Interactive Ability → Reflective Ability		
SPECIALIST EXPERTISES	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*		
	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise	
				Polimorphic → *Mimeomorphic*		
META-EXPERTISES	*EXTERNAL*		*INTERNAL*			
	Ubiquitous Discrimination	Local Discrimination	Technical Connoisseurship	Downward Discrimination	Referred Expertise	
META-CRITERIA	Credentials		Experience	Track-Record		

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES						
DISPOSITIONS				Interactive Ability / Reflective Ability		
SPECIALIST EXPERTISES	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*		
	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise	
				Polimorphic / *Mimeomorphic*		
META-EXPERTISES	*EXTERNAL*		*INTERNAL*			
	Ubiquitous Discrimination	Local Discrimination	Technical Connoisseurship	Downward Discrimination	Referred Expertise	
META-CRITERIA	Credentials		Experience	Track-Record		

University of Chicago Press 2004



30-year case study: 870 pages

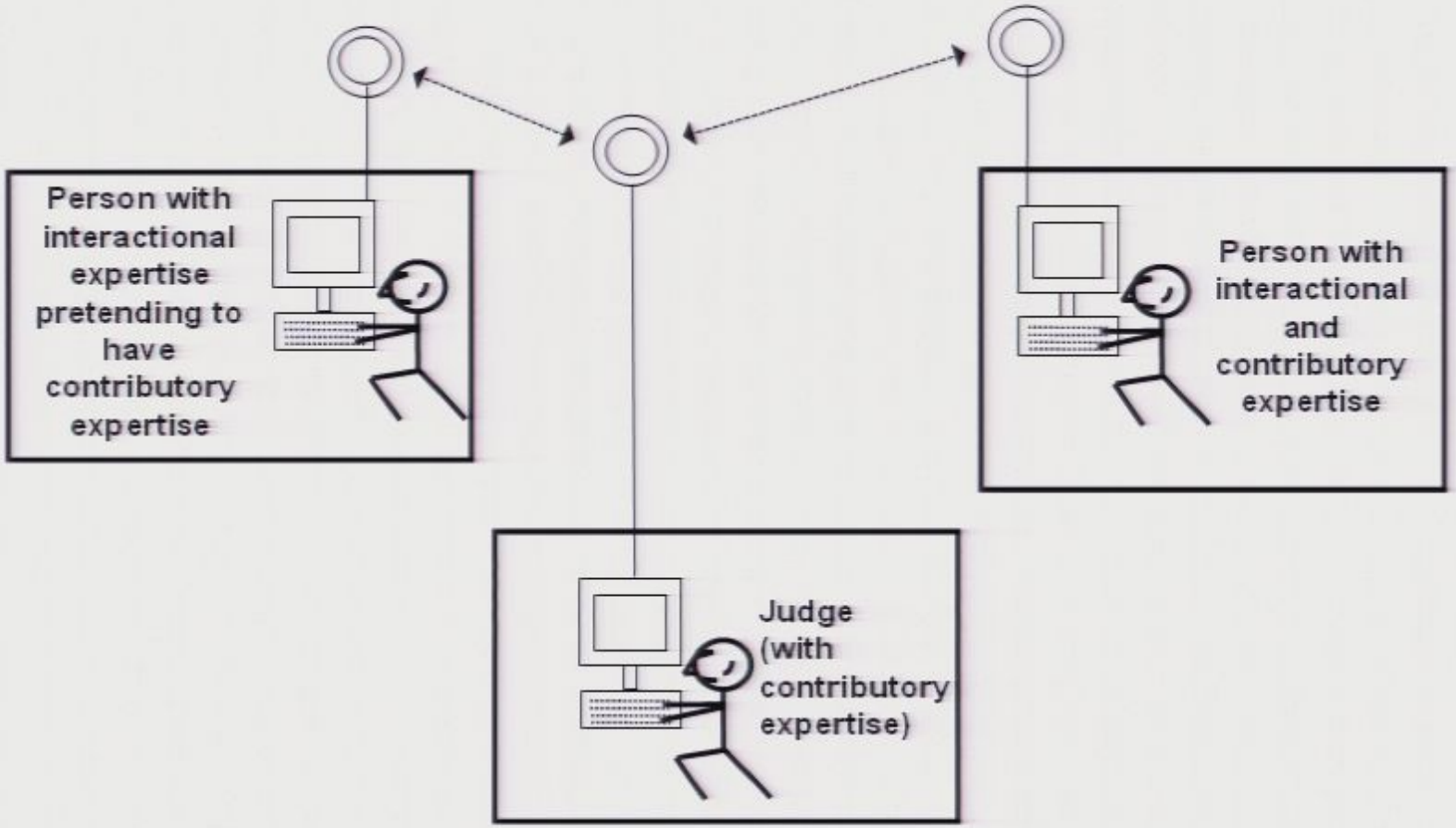
www.cardiff.ac.uk\socsi\gravwave

or Google Harry Collins

Interactional Expertise

Can you learn a domain language without the domain abilities?

The Imitation Game



Q2) Is a spherical resonant mass detector equally sensitive to radiation from all over the sky?	
A2) Yes, unlike cylindrical bar detectors which are most sensitive to gravitational radiation coming from a direction perpendicular to the long axis.	B2) Yes it is.
Q3) State if after a burst of gravitational waves pass by, a bar antenna continues to ring and mirrors of an interferometer continue to oscillate from their mean positions? (only motion in the relevant frequency range is important).	
A3) Bars will continue to ring, but the mirrors in the interferometer will not continue to oscillate.	B3) Bars continue to ring; the separation of interferometer mirrors, however, follows the pattern of the wave in real time.
Q5) A theorist tells you that she has come up with a theory in which a circular ring of particles are displaced by GW so that the circular shape remains the same but the size oscillates about a mean size. Would it be possible to measure this effect using a laser interferometer?	
A5) Yes, but you should analyse the sum of the strains in the two arms, rather than the difference. You don't even need two arms to detect GWs, provided you can measure the round-trip light travel time along a single arm accurately enough to detect small changes in its length.	B5) It depends on the direction of the source. There will be no detectable signal if the source lies anywhere on the plane which passes through the center station and bisects the angle of the two arms. Otherwise there will be a signal, maximised when the source lies along one or other of the two arms.
Q6) Imagine the mirrors of an interferometer are equally but oppositely (electrically) charged. Could the effect of a radio-wave on the interferometer be the same as a gravitational wave?	
A6) In principle you could detect the passage of an electromagnetic (EM) wave, but the effect is different than for a GW. Unlike EM waves, GWs produce quadrupolar deformations. A typical EM wave would change the distance in only one arm while a typical GW wave would change the distances (in opposite ways) in both, so the differential signal for the EM wave would be half that for a GW.	B6) Since gravitational waves change the shape of spacetime and radio waves do not, the effect on an interferometer of radio waves can only be to mimic the effects of a gravitational wave, not reproduce them. An EM wave could, however, produce noise which could be mistaken for a GW under the circumstances described.

Q2) Is a spherical resonant mass detector equally sensitive to radiation from all over the sky?	
A2) Yes, unlike cylindrical bar detectors which are most sensitive to gravitational radiation coming from a direction perpendicular to the long axis.	B2) Yes it is.
Q3) State if after a burst of gravitational waves pass by, a bar antenna continues to ring and mirrors of an interferometer continue to oscillate from their mean positions? (only motion in the relevant frequency range is important).	
A3) Bars will continue to ring, but the mirrors in the interferometer will not continue to oscillate.	B3) Bars continue to ring; the separation of interferometer mirrors, however, follows the pattern of the wave in real time.
Q5) A theorist tells you that she has come up with a theory in which a circular ring of particles are displaced by GW so that the circular shape remains the same but the size oscillates about a mean size. Would it be possible to measure this effect using a laser interferometer?	
A5) Yes, but you should analyse the sum of the strains in the two arms, rather than the difference. You don't even need two arms to detect GWs, provided you can measure the round-trip light travel time along a single arm accurately enough to detect small changes in its length.	B5) It depends on the direction of the source. There will be no detectable signal if the source lies anywhere on the plane which passes through the center station and bisects the angle of the two arms. Otherwise there will be a signal, maximised when the source lies along one or other of the two arms.
Q6) Imagine the mirrors of an interferometer are equally but oppositely (electrically) charged. Could the effect of a radio-wave on the interferometer be the same as a gravitational wave?	
A6) In principle you could detect the passage of an electromagnetic (EM) wave, but the effect is different than for a GW. Unlike EM waves, GWs produce quadrupolar deformations. A typical EM wave would change the distance in only one arm while a typical GW wave would change the distances (in opposite ways) in both, so the differential signal for the EM wave would be half that for a GW.	B6) Since gravitational waves change the shape of spacetime and radio waves do not, the effect on an interferometer of radio waves can only be to mimic the effects of a gravitational wave, not reproduce them. An EM wave could, however, produce noise which could be mistaken for a GW under the circumstances described.

Q5) A theorist tells you that she has come up with a theory in which a circular ring of particles are displaced by GW so that the circular shape remains the same but the size oscillates about a mean size. Would it be possible to measure this effect using a laser interferometer?

A5) Yes, but you should analyse the sum of the strains in the two arms, rather than the difference. In fact, you don't even need two arms of an interferometer to detect GWs, provided you can measure the round-trip light travel time along a single arm accurately enough to detect small changes in its length.

B5) It depends on the direction of the source. There will be no detectable signal if the source lies anywhere on the plane which passes through the center station and bisects the angle of the two arms. Otherwise there will be a signal, maximised when the source lies along one or other of the two arms.

Sociologist fools physics judges

After more than 30 years of studying the physicists who work on gravity waves, spending countless hours talking to physicists and writing a book on the history and sociology of the field, social scientist Harry Collins had a question. Could he pass as a physicist?

He reckons he can — and he has the experimental data to prove it. Collins's study, to be published later this year, is the first experiment on the concept of 'interactional expertise', an idea that could influence areas such as peer review and science journalism. It could even help settle a question lingering since the science wars of the 1990s, when sociologists launched what scientists saw as attacks on the very nature of science, and scientists responded in kind.

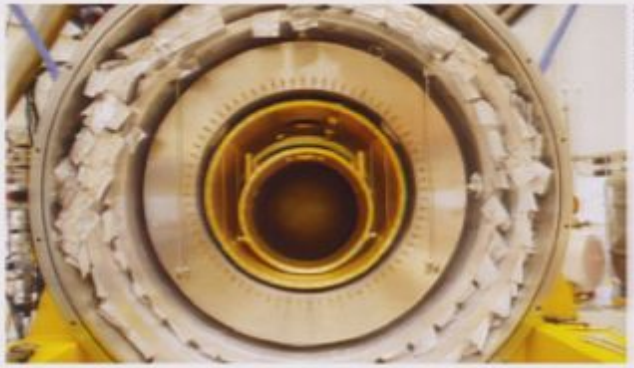
Collins's claim rests on his answers to a set of seven questions about gravity-wave physics set by a gravity-wave physicist. His replies, together with those from a real gravitational physicist, were sent to nine researchers in the field (see 'Faking it'). Asked to spot the real physicist, seven were unsure and two chose Collins. The results appear in a paper co-authored with Rob Evans, like Collins based at Cardiff University, UK. It is due to be published this December in *Studies in the History of Philosophy of Science* (for a preprint see www.cf.ac.uk/socsi/expertise).

Nature sent the questions and answers to Sheila Rowan, a gravitational-wave physicist at the University of Glasgow. She was likewise unable to spot the impostor. "The answers are different but it's not obvious which are not by a graduate scientist," she says.

"I could not run LIGO [a US gravity-wave detector] or do lots of other things," says Collins. "But the results do show that outsiders can develop a kind of expertise in a scientific field", even if they cannot carry out the relevant experiments and do not know the mathematics involved.

Collins says this kind of expertise, known as interactional to contrast with the 'contributory expertise' that comes from being able to do experiments and develop theories, should not be dismissed. He points out, for example, that it is important in activities such as grant allocation, in which peer-review panels may include scientists who know the concepts associated with a field, but lack technical understanding.

In a second experiment, Collins and Evans got groups of colour-blind people to pretend they could see colours. Judges compared their performance in conversation with that of people with normal sight. As Collins expected, the colour-blind, immersed in the language of colour vision, had the interactional expertise to pass as colour-perceivers. In contrast, people lacking perfect musical pitch could not pass for those who could. Very few have such an ability, so those lacking it have not learnt to describe how the skill feels.



He might not be able to run this gravity-wave detector, but a social scientist passed himself off as a physicist.

Faking it

One answer to the following question is from an experienced gravity-wave physicist, the other is from social scientist Harry Collins of Cardiff University, UK. To find out which is which, see page 15.

A theorist tells you that she has come up with a theory in which a circular ring of particles is displaced by gravitational waves so that the circular shape remains the same but the size oscillates about a mean size. Would it be possible to measure this effect using a laser interferometer?

A: Yes, but you should analyse the sum of the strains in the two arms, rather than the difference. In fact, you don't even need two arms of an interferometer to detect gravitational waves, provided you can measure the round-trip light travel time along a single arm accurately enough to detect small changes in its length.

B: It depends on the direction of the source. There will be no detectable signal if the source lies anywhere on the plane that passes through the centre station and bisects the angle of the two arms. Otherwise there will be a signal, maximized when the source lies along one or other of the two arms.

If the concept of interactional expertise catches on, it could affect the argument about whether an outsider, such as an anthropologist, can properly understand another group, such as a remote rural community. The debate was part of the science wars, when some scientists claimed that sociologists studying science did not understand the disciplines involved, in part because they did not practise them.

Collins's results do not end that discussion, but they do suggest that outsiders can develop expertise in a field. Collins says that investigators now have a way to display their expertise — and that they and their critics can talk sensibly about whether it is appropriate.

One of the main protagonists in the debate was Alan Sokal, a physicist at New York University who authored a spoof science-studies paper that was accepted by *Social Text*, a cultural research journal. The paper, which consisted of meaningless arguments about quantum theory, was intended to expose what Sokal and others saw as a lack of academic rigour among sociologists.

Sokal says he is struck by Collins's skills in physics, but notes that such understanding would not be enough for more ambitious sociology research that attempts to probe how cultural and scientific factors shape science. "If that's your goal you need a knowledge of the field that is virtually, if not fully, at the level of researchers in the field," says Sokal. "Unless you understand the science you can't get into the theories." ■

Jim Giles

NATURE
6 July 2006

Different arrangements of GW imitation game

GW scientist

Collins

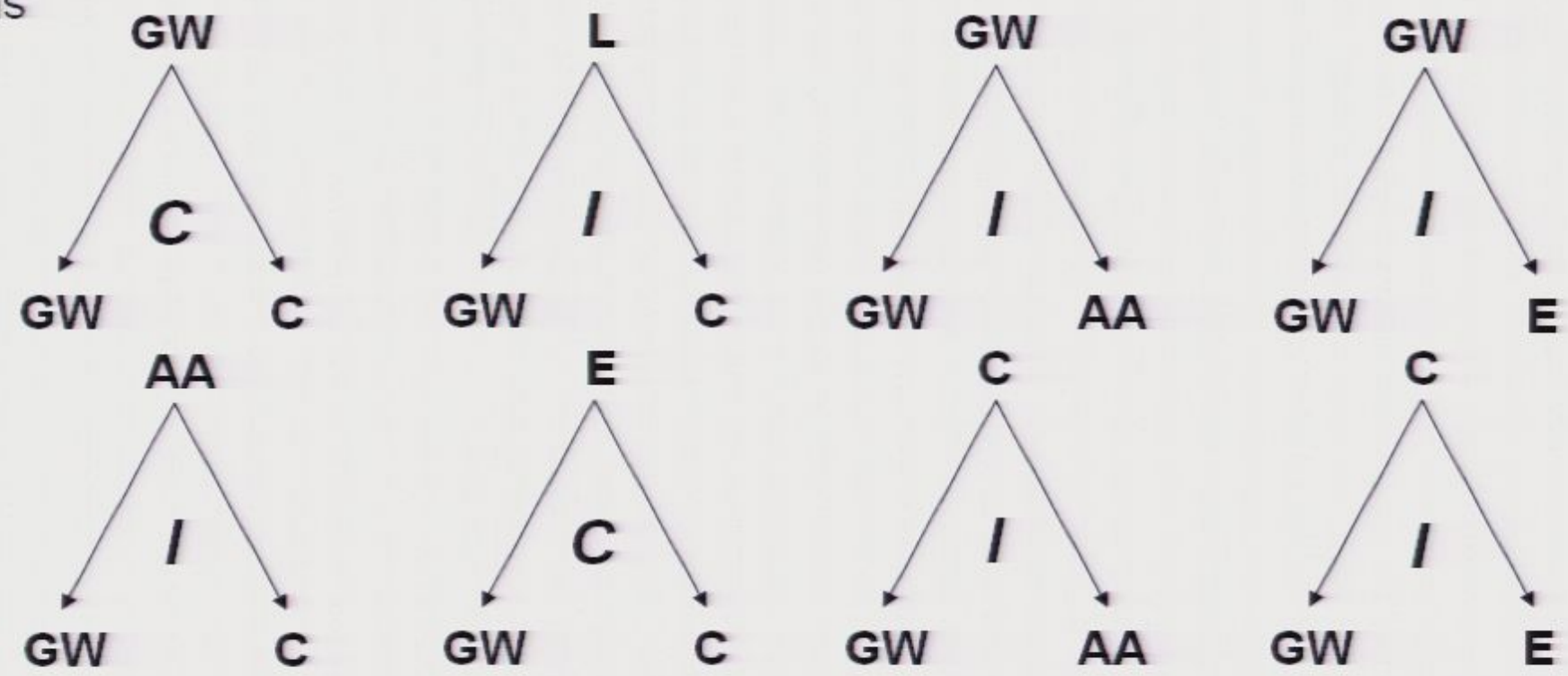
Lay person

Astrophysicists and **A**stronomers [Non-GW]

Evans

*C*hance

*I*dentify



Different arrangements of GW imitation game

GW scientist

Collins

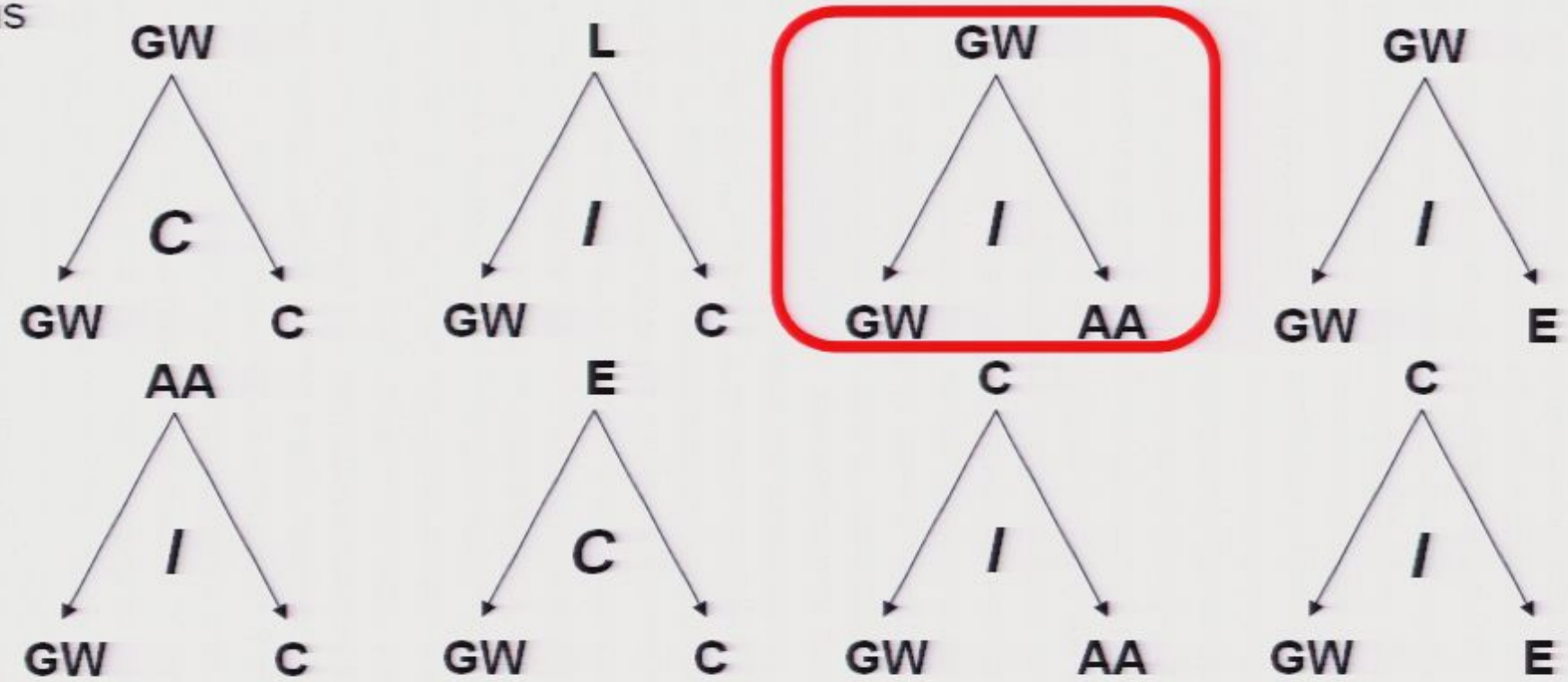
Lay person

Astrophysicists and **A**stronomers [Non-GW]

Evans

Chance

Identify



Different arrangements of GW imitation game

GW scientist

Collins

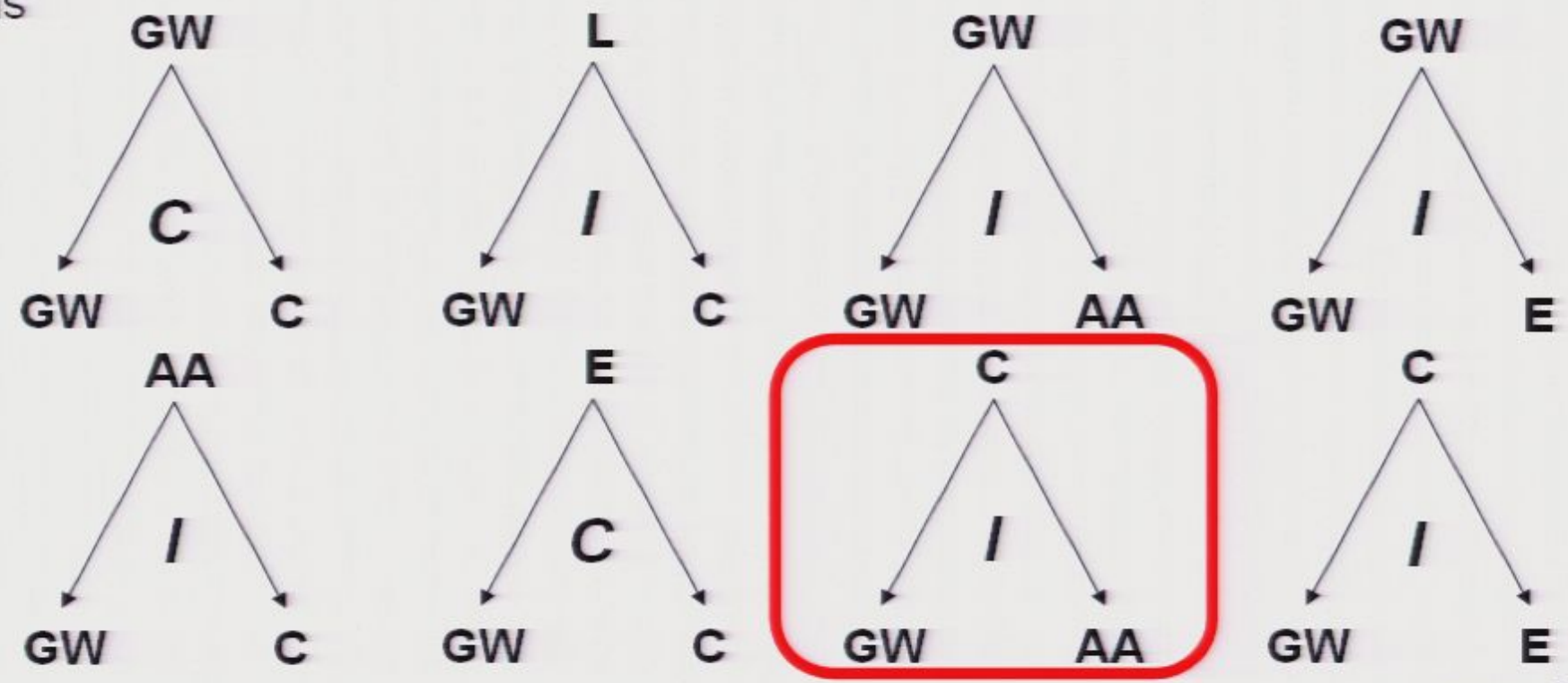
Lay person

Astrophysicists and **A**stronomers [Non-GW]

Evans

Chance

Identify



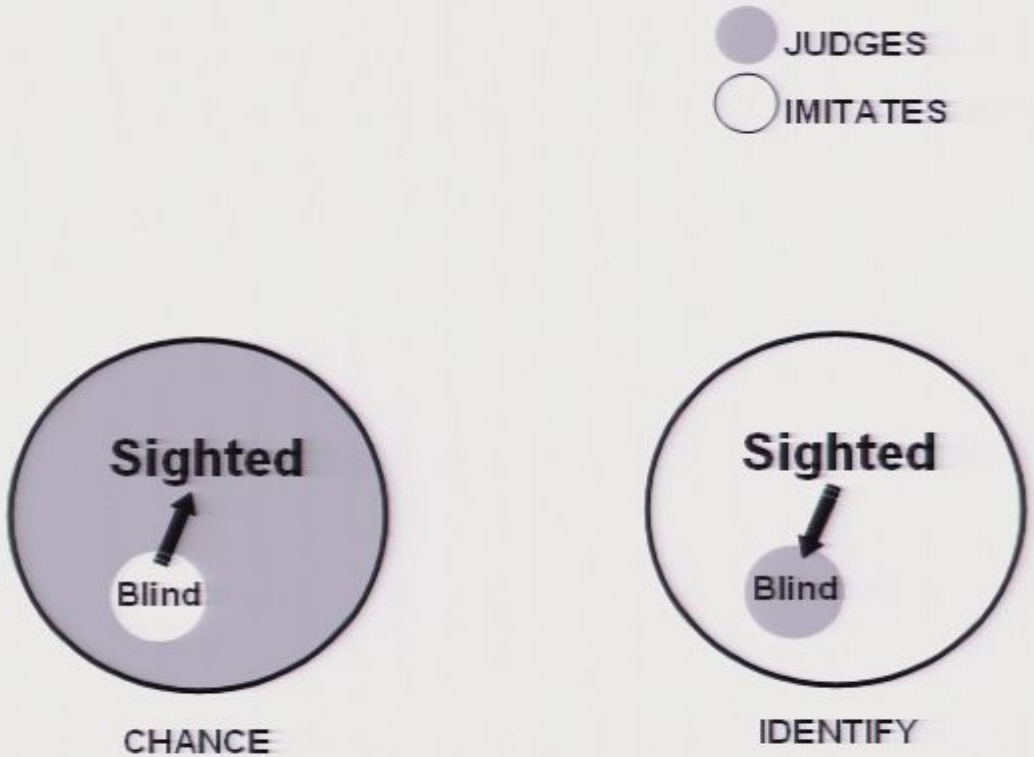
Experimental configurations

JUDGES

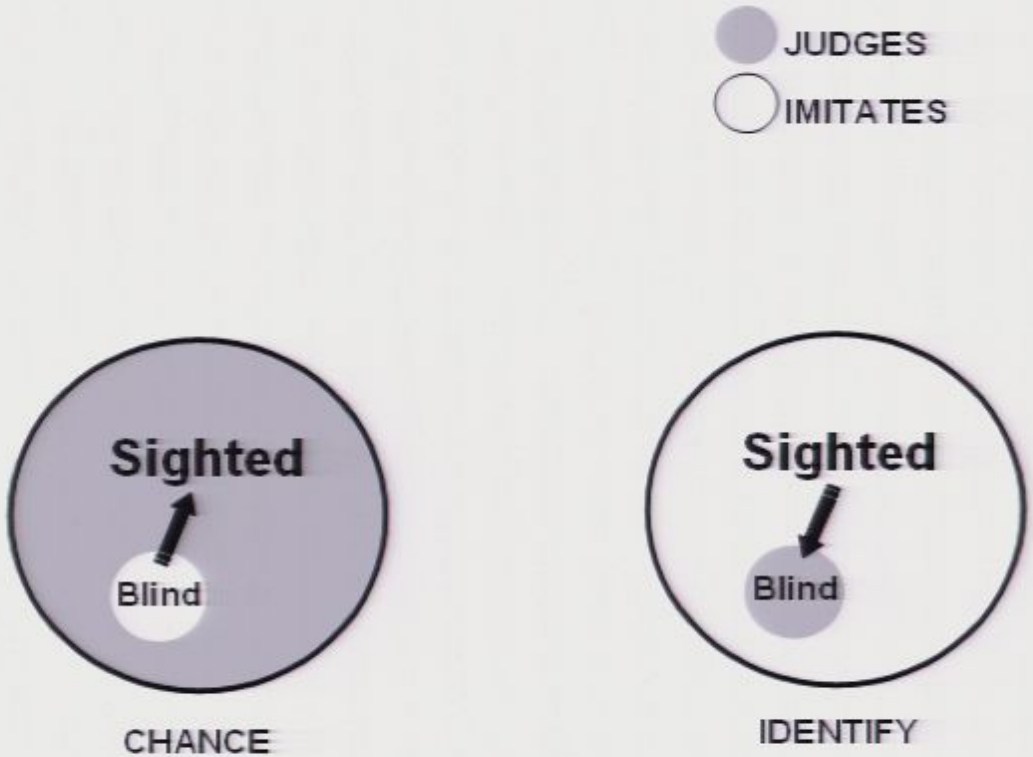
IMITATES

CHANCE

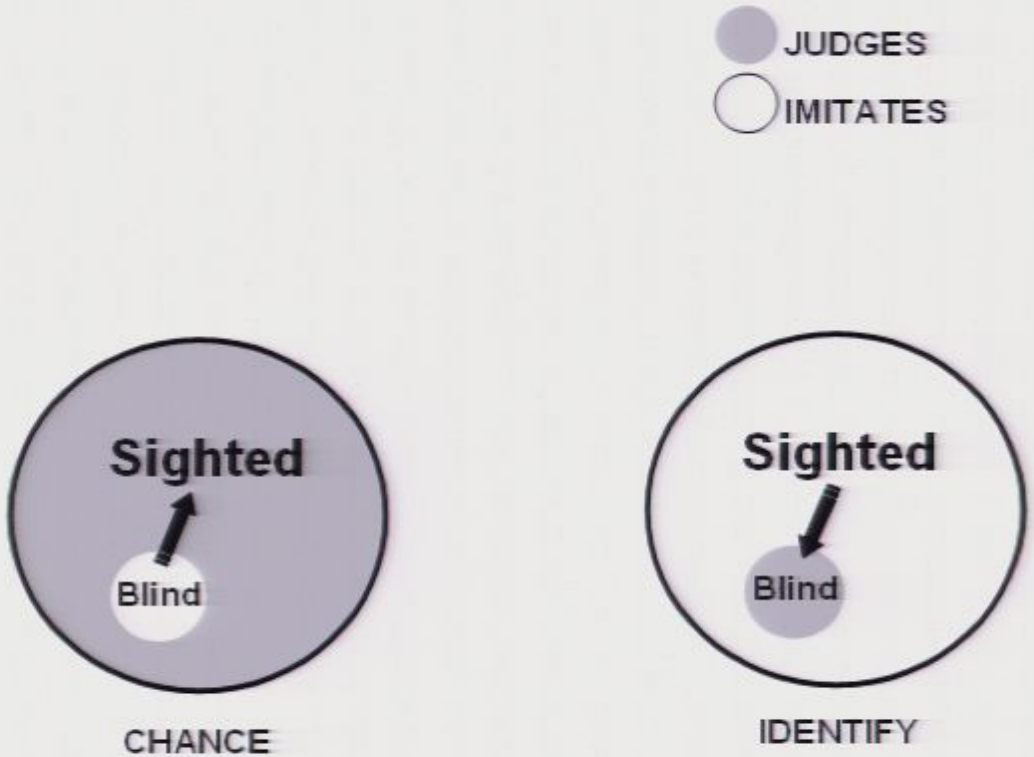
Experimental configurations



Experimental configurations



Experimental configurations



Who's sighted?

How accurately would you say a human can judge the flight of a tennis ball. I mean, would you say they could tell the difference between touch the line and 1mm out 2mm out 1 cm out, 2 cm out, or what, and what would it depend on?

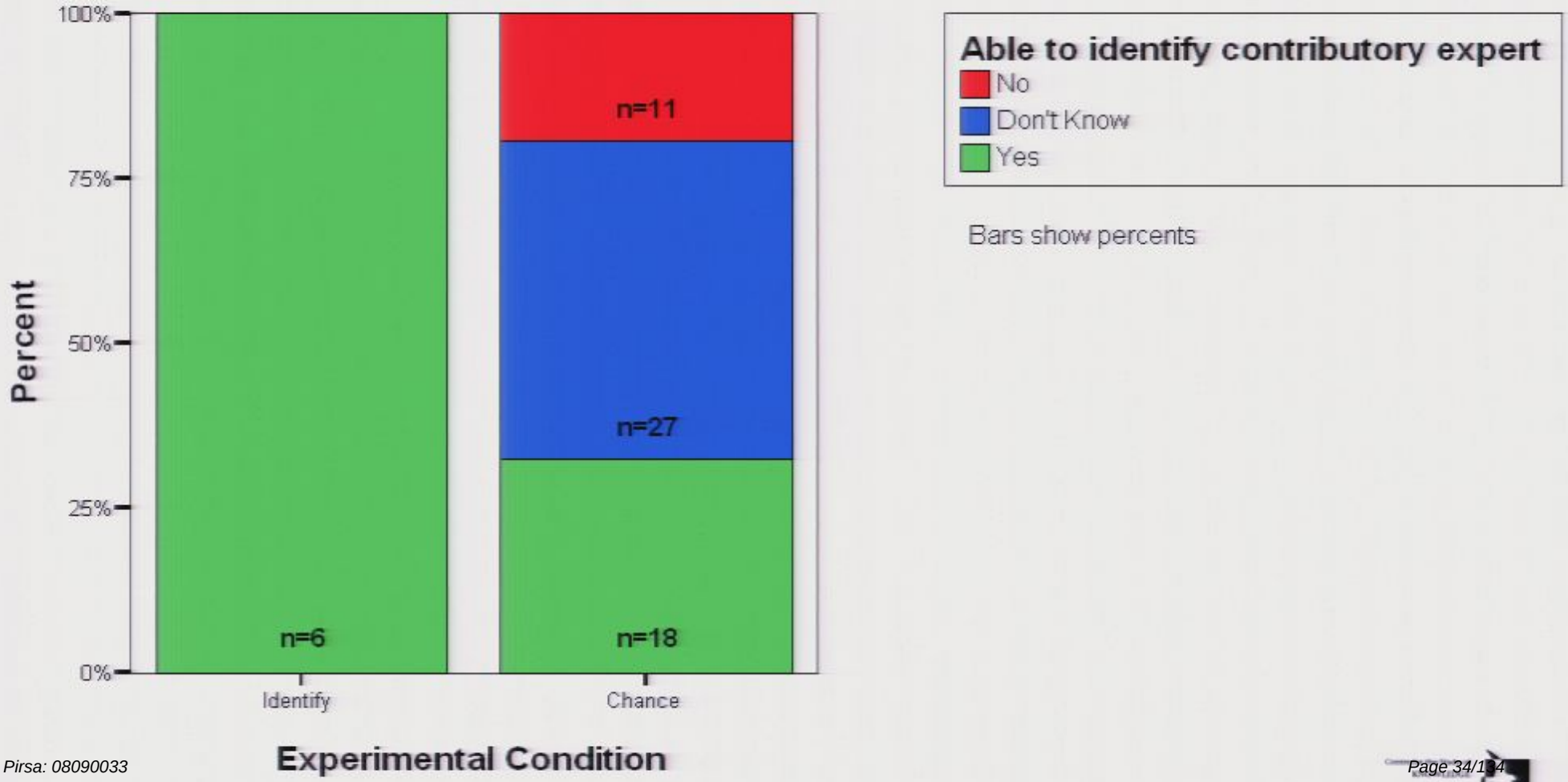
I think often a tennis player is not in a position to judge accurately as they are not usually parallel with the line. I think that if you set up a test for a line judge with two balls one which landed on the line and one which landed 1mm away from the line, I don't think they could tell the difference. If you think how small 1mm is then it would be so hard for them to judge.

it would depend on the speed the ball was travelling and the position of the judge relative to the line and obviously the closer the ball is the line the harder it would be to make a judgement. So you would have to judge each call on an individual bases as there are a lot of factors.

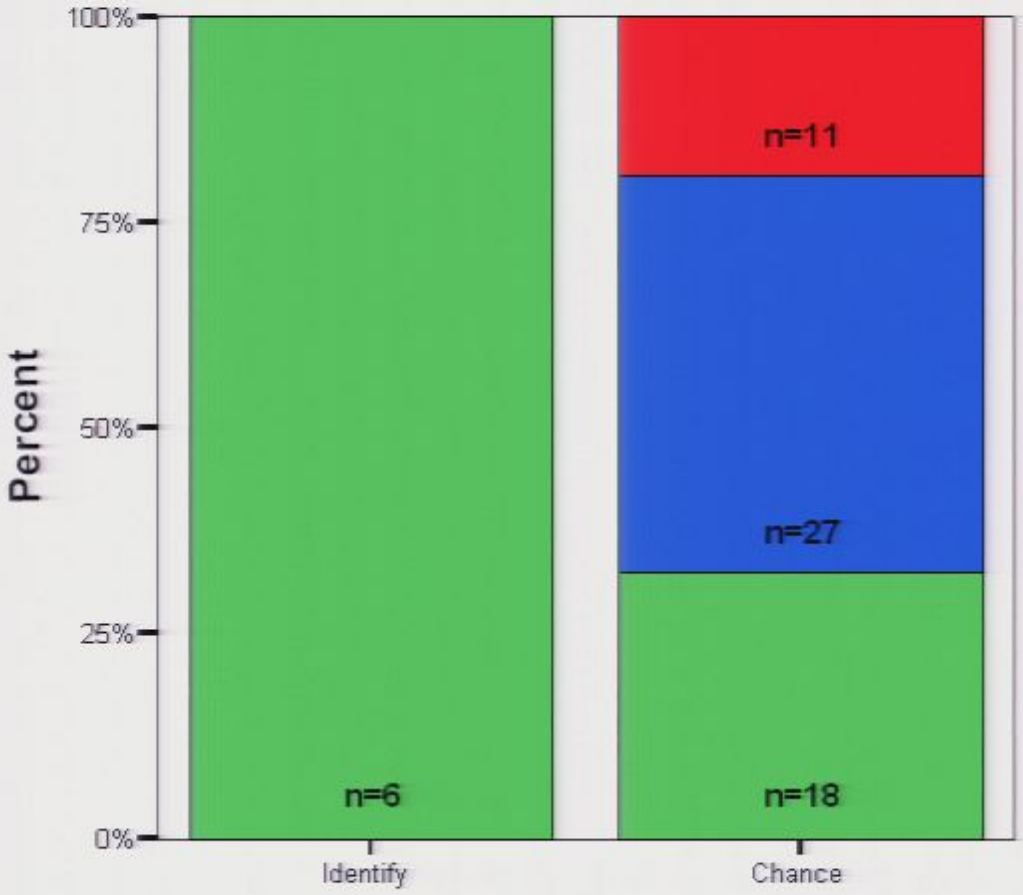
Who's blind?

sometimes on the internet, mostly I get assistance in the local supermarkets.	**How do you do your food shopping?**	I tend to go to the same places each time and I try to get people to help me. It is easier if I can order over the phone and have it delivered.
They mostly admire the dog first. Some adopt a very motherly approach to taking care of me. These often then say how wonderful I am that I manage so well. Others seem not to notice which is very refreshing.	**How do sighted people react towards you when they meet you for the first time?**	They don't know if they ought to wait for me to make the first move. They always ask me the same questions.

Outcome graphed



Outcome graphed



Able to identify contributory expert

- No
- Don't Know
- Yes

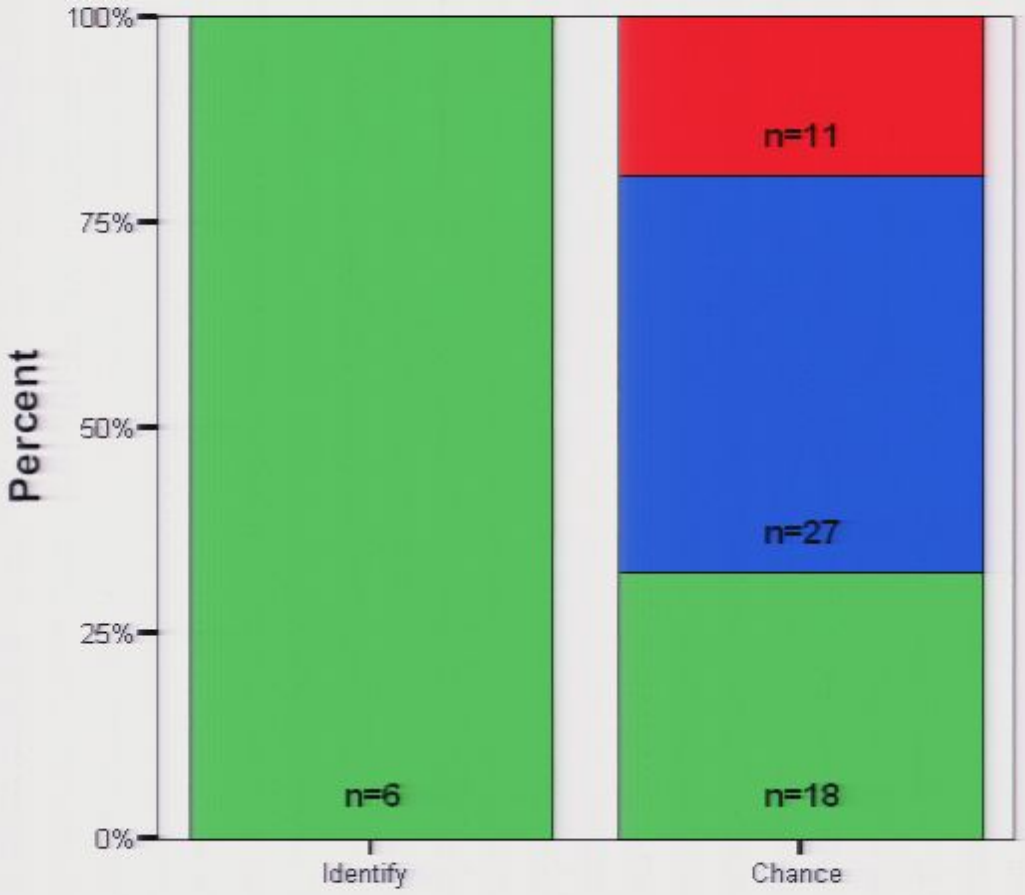
Bars show percents

Chi sq = 0.005

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES						
DISPOSITIONS				Interactive Ability / Reflective Ability		
SPECIALIST EXPERTISES	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*		
	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise	
				Polimorphic / *Mimeomorphic*		
META-EXPERTISES	*EXTERNAL*		*INTERNAL*			
	Ubiquitous Discrimination	Local Discrimination	Technical Connoisseurship	Downward Discrimination	Referred Expertise	
META-CRITERIA	Credentials		Experience	Track-Record		

Outcome graphed



Able to identify contributory expert

- No
- Don't Know
- Yes

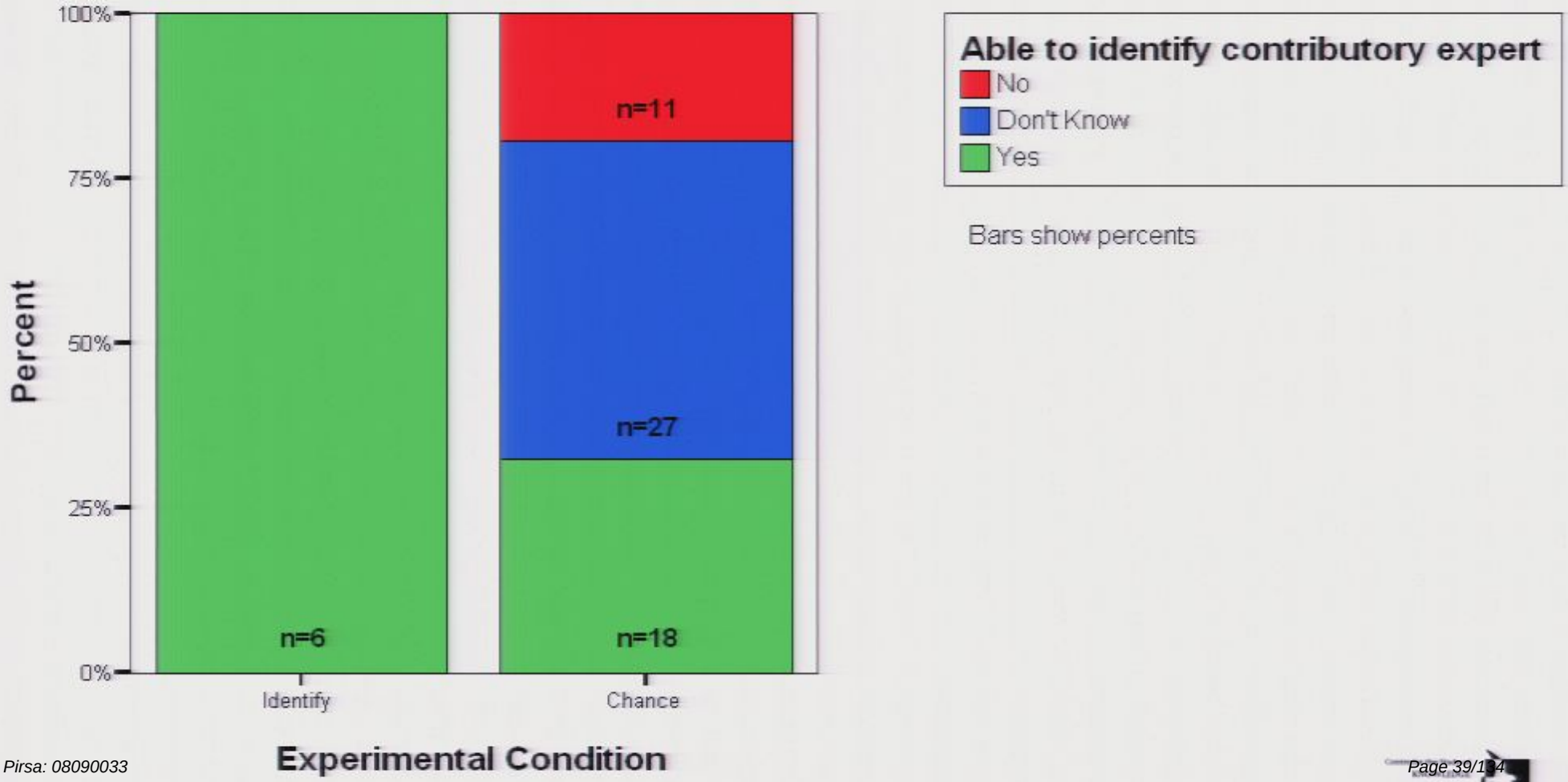
Bars show percents

Chi sq = 0.005

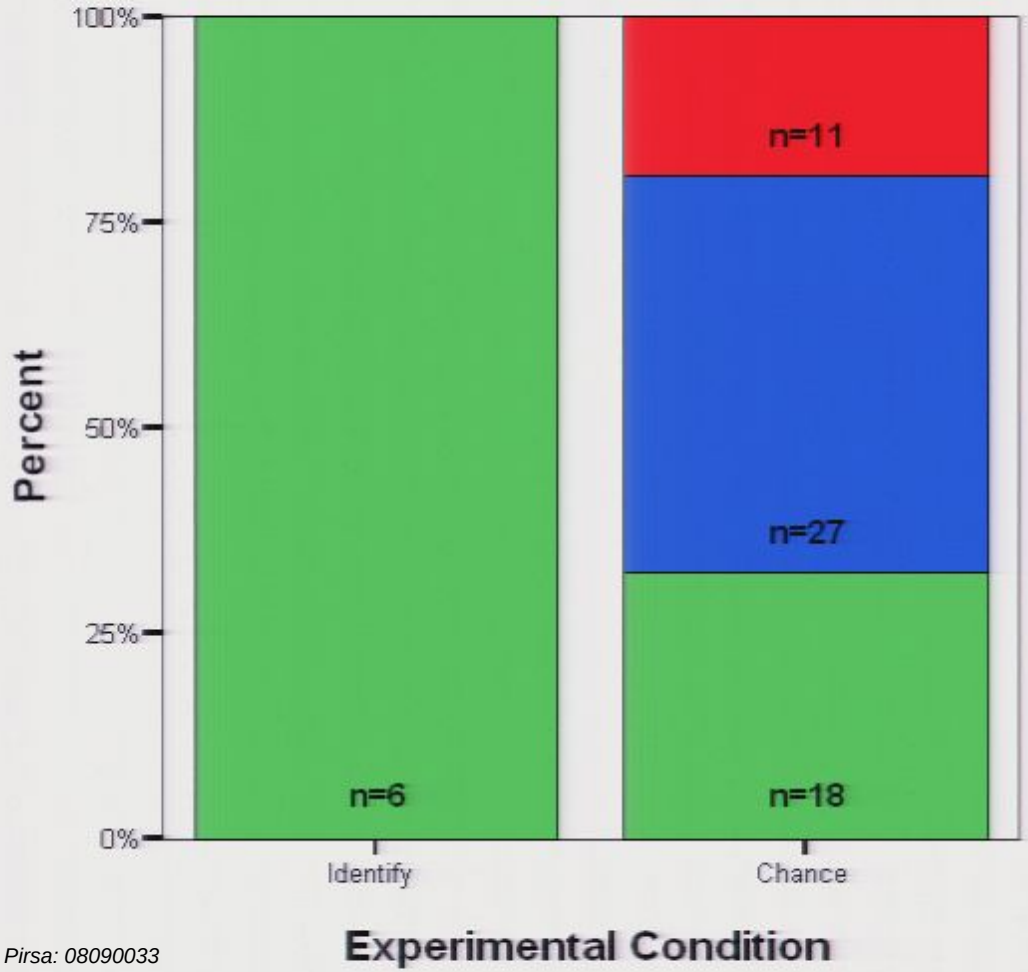
Who's blind?

sometimes on the internet, mostly I get assistance in the local supermarkets.	**How do you do your food shopping?**	I tend to go to the same places each time and I try to get people to help me. It is easier if I can order over the phone and have it delivered.
They mostly admire the dog first. Some adopt a very motherly approach to taking care of me. These often then say how wonderful I am that I manage so well. Others seem not to notice which is very refreshing.	**How do sighted people react towards you when they meet you for the first time?**	They don't know if they ought to wait for me to make the first move. They always ask me the same questions.

Outcome graphed



Outcome graphed



Able to identify contributory expert

- No
- Don't Know
- Yes

Bars show percents

Chi sq = 0.005

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES						
DISPOSITIONS				Interactive Ability / Reflective Ability		
SPECIALIST EXPERTISES	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*		
	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise	
				Polimorphic / *Mimeomorphic*		
META-EXPERTISES	*EXTERNAL*		*INTERNAL*			
	Ubiquitous Discrimination	Local Discrimination	Technical Connoisseurship	Downward Discrimination	Referred Expertise	
META-CRITERIA	Credentials		Experience	Track-Record		

Referred Expertise

"They Give You the Keys and say Drive It!" Managers, Referred Expertise, and other Expertises

Harry Collins and Gary Sanders

Referred Expertise

"They Give You the Keys and say Drive It!" Managers, Referred Expertise, and other Expertises

Harry Collins and Gary Sanders

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007

Referred Expertise

"They Give You the Keys and say Drive It!" Managers, Referred Expertise, and other Expertises

Harry Collins and Gary Sanders

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007

INTERACTIONAL EXPERTISE TOO

This whole art of sensing the wavefront distortion and doing the mathematics to unfold the correct corrections, is an extremely arcane field… But I've found that, remarkably, what you call interactional expertise was not hard to achieve. I couldn't design an adaptive optics system but I really do after six to nine months in the field, I really do understand the different kinds of adaptive optics in the field and the way that they work and I can draw a schematic and define the algorithm, and understand the technological readiness of the different techniques …

if someone said to me, `OK Sanders, we agree with you, now go and design a multi-conjugative adaptive optics system,' I couldn't do it. I couldn't sit down and write out the equations

Referred Expertise

"They Give You the Keys and say Drive It!" Managers, Referred Expertise, and other Expertises

Harry Collins and Gary Sanders

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007

Referred Expertise

"They Give You the Keys and say Drive It!" Managers, Referred Expertise, and other Expertises

Harry Collins and Gary Sanders

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

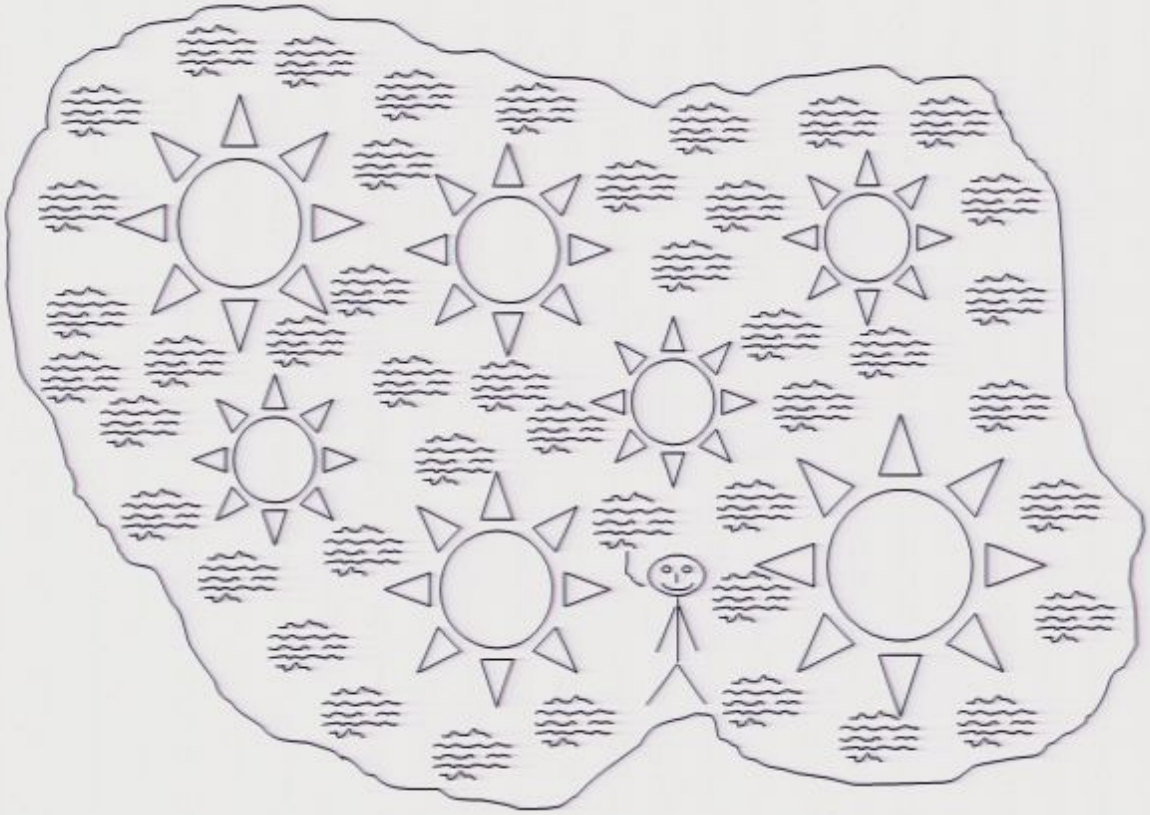
December 2007

INTERACTIONAL EXPERTISE TOO

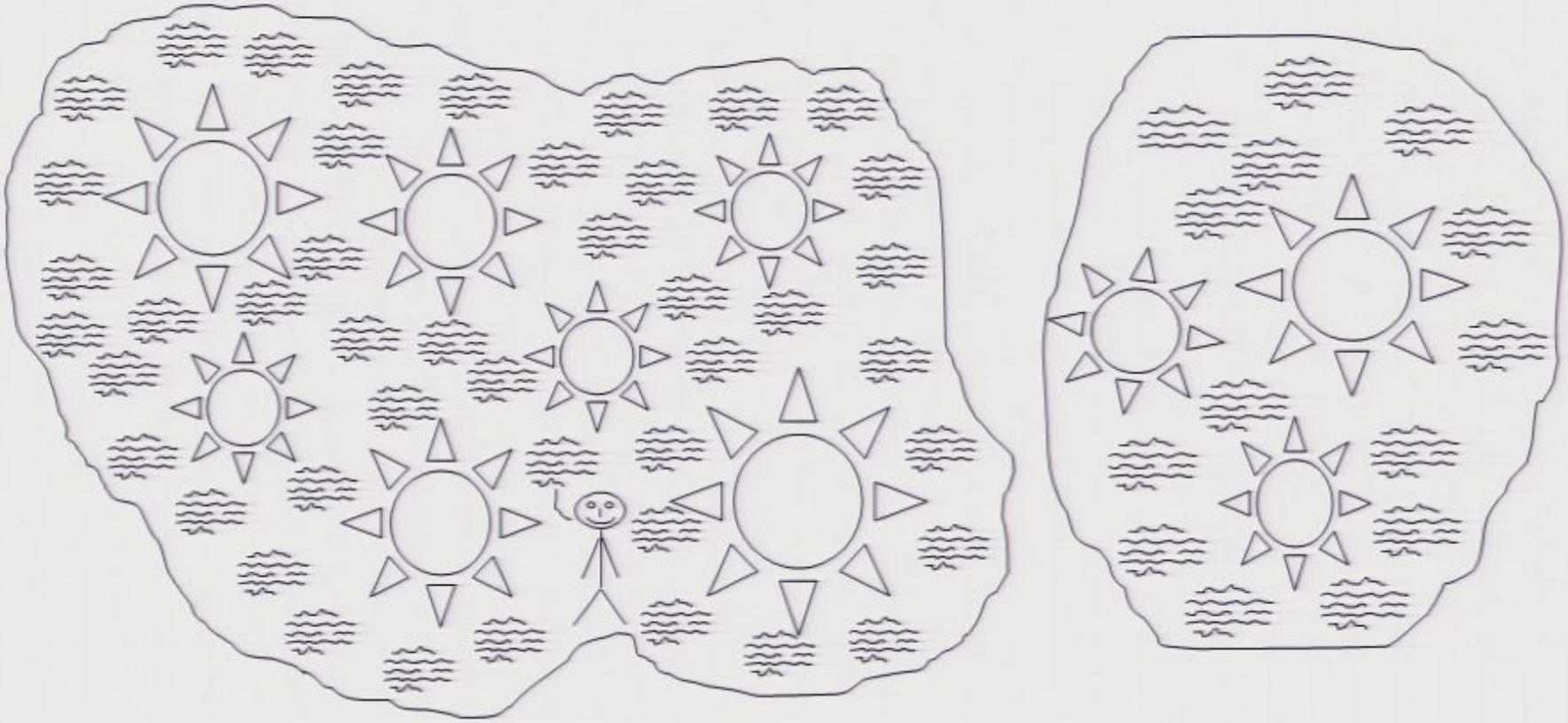
This whole art of sensing the wavefront distortion and doing the mathematics to unfold the correct corrections, is an extremely arcane field… But I've found that, remarkably, what you call interactional expertise was not hard to achieve. I couldn't design an adaptive optics system but I really do after six to nine months in the field, I really do understand the different kinds of adaptive optics in the field and the way that they work and I can draw a schematic and define the algorithm, and understand the technological readiness of the different techniques …

if someone said to me, `OK Sanders, we agree with you, now go and design a multi-conjugative adaptive optics system,' I couldn't do it. I couldn't sit down and write out the equations

Sociologist and manager



Sociologist and manager



Interdisciplinarity

Trading Zones and Interactional Expertise

Harry Collins, Robert Evans, Mike Gorman

Interdisciplinarity

Trading Zones and Interactional Expertise

Harry Collins, Robert Evans, Mike Gorman

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

Interdisciplinarity

Trading Zones and Interactional Expertise

Harry Collins, Robert Evans, Mike Gorman

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

By 1975 these claims almost universally rejected but a new field founded (c $240M initially)

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

By 1975 these claims almost universally rejected but a new field founded (c $240M initially)

Joe Weber with cylindrical bar

In late 1960s and early 1970s claimed he had seen gravitational waves with a bar detector (c $100,000)

By 1975 these claims almost universally rejected but a new field founded (c $240M initially)

Weber never accepted he was wrong (died 2000)

Hanford and Livingston

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES

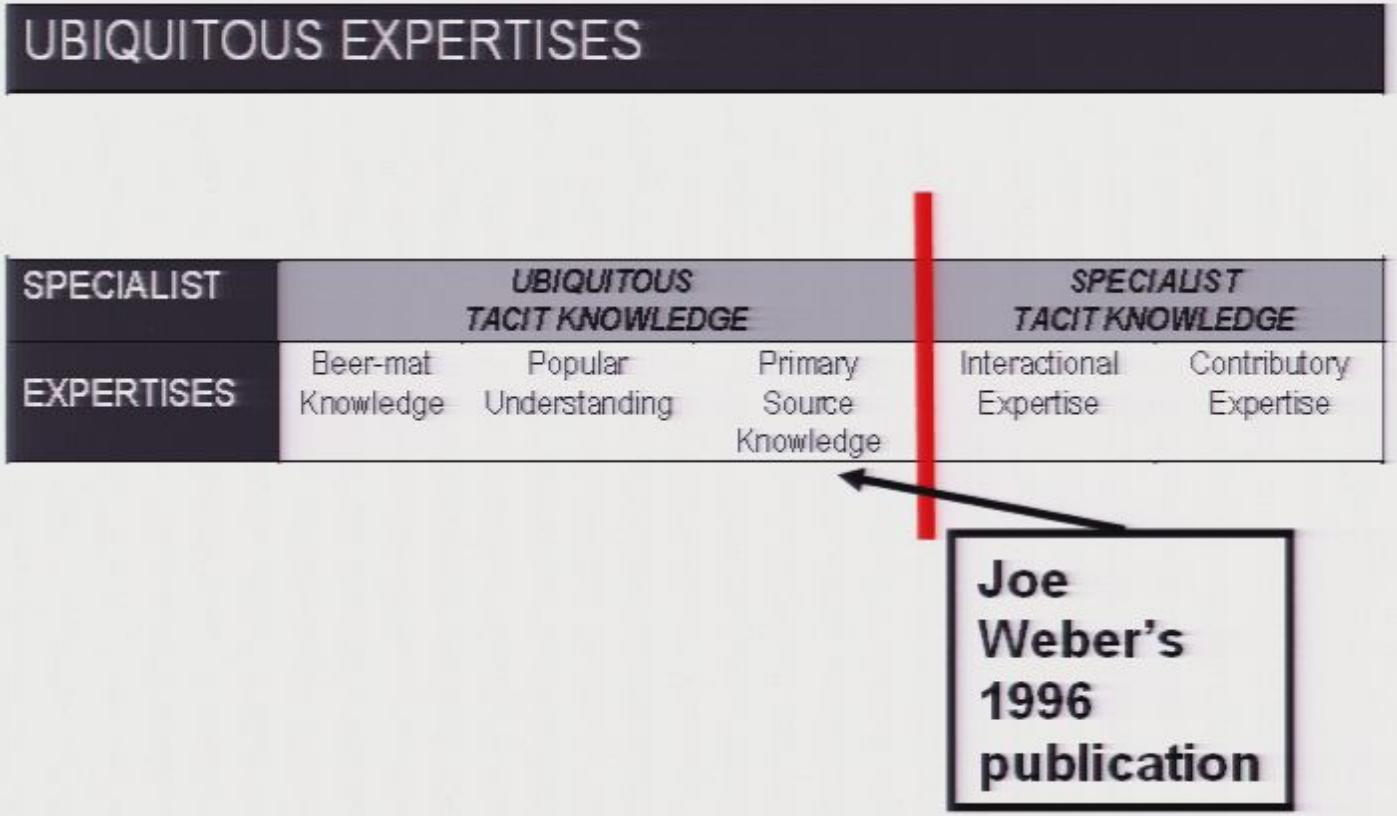
SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Periodic Table of Expertises (PTE)

UBIQUITOUS EXPERTISES					
SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

B5) It depends on the direction of the source. There will be no detectable signal if the source lies anywhere on the plane which passes through the cente station and bisects the angle of the two arms. Otherwise there will be a signal, maximised whe the source lies along one or other of the two arms

Periodic Table of Expertises (PTE)



IL NUOVO CIMENTO Vol. 111 B, N. 6 Giugno 1996

Search for correlations of gamma-ray bursts with gravitational-radiation antenna pulses

J. WEBER and B. RADAK

Department of Physics, University of Maryland - College Park, MD 20742, USA
Department of Physics, University of California - Irvine, CA 92717, USA

(ricevuto il 25 Maggio 1996; revisionato il 12 Gennaio 1996; approvato il 16 Febbraio 1996)

Summary. — Gravitational-radiation-antenna outputs were plotted, for 20 s periods which included one gamma-ray burst trigger time. Data were obtained for two gravitational-radiation antennas. For the first 80 burst times which were studied, it is observed that either the largest or second-largest gravitational-radiation detector pulse peak occurs within 0.5 s of the gamma-ray burst trigger time for 20 of the 80 gamma-ray bursts, for the larger of the two gravitational antennas. The probability that the correlations are accidental is estimated as approximately $6 \cdot 10^{-5}$.

PACS 95.30Sf – Relativity and gravitation.

1. – Introduction

The First BATSE Gamma-Ray Burst Catalog begins with the statement that «In spite of two decades of study, the origin of gamma-ray bursts remains an enigma». Since the gamma-ray bursts may be associated with mass elements moving at very high velocities, bursts of gravitational radiation might be emitted.

Ormes and Weber, independently, suggested that there might be correlations between gamma-ray bursts and outputs of gravitational-radiation antennas. Search has recently been carried out by employing magnetic tapes with recorded outputs of two gravitational-radiation antennas which were operating for extended periods in 1991 and 1992.

2. – Analyses

The magnetic tapes which were studied have two channels with recorded data. One is for a 3600 kg mass gravitational-radiation antenna with the great isolation from seismic and electromagnetic disturbances resulting from the interior acoustic filtering and shielding of a large thick-walled vacuum chamber. The second channel records data for an earlier-design 1700 kg mass gravitational-radiation antenna with

IL NUOVO CIMENTO Vol. 111 B, N. 6 Giugno 1996

Search for correlations of gamma-ray bursts with gravitational-radiation antenna pulses

J. WEBER and B. RADAK

Summary. — Gravitational-radiation-antenna outputs were plotted, for 20 s periods which included one gamma-ray burst trigger time. Data were obtained for two gravitational-radiation antennas. For the first 80 burst times which were studied, it is observed that either the largest or second-largest gravitational-radiation detector pulse peak occurs within 0.5 s of the gamma-ray burst trigger time for 20 of the 80 gamma-ray bursts, for the larger of the two gravitational antennas. The probability that the correlations are accidental is estimated as approximately $6 \cdot 10^{-5}$.

PACS 95.30Sf – Relativity and gravitation.

detecting data switching on a large thick-walled vacuum chamber. The second channel records data for an earlier-design 1700 kg mass gravitational-radiation antenna with

IL NUOVO CIMENTO Vol. 111 B, N. 6 Giugno 1996

Search for correlations of gamma-ray bursts with gravitational-radiation antenna pulses

J. WEBER and B. RADAK

Summary. — Gravitational-radiation-antenna outputs were plotted, for 20 s periods which included one gamma-ray burst trigger time. Data were obtained for two gravitational-radiation antennas. For the first 80 burst times which were studied, it is observed that either the largest or second-largest gravitational-radiation detector pulse peak occurs within 0.5 s of the gamma-ray burst trigger time for 20 of the 80 gamma-ray bursts, for the larger of the two gravitational antennas. The probability that the correlations are accidental is estimated as approximately $6 \cdot 10^{-5}$.

PACS 95.30Sf – Relativity and gravitation.

detecting and shielding in a large thick-walled vacuum chamber. The second channel records data for an earlier-design 1700 kg mass gravitational-radiation antenna with

UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Joe Weber's 1996 publication

UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication

UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

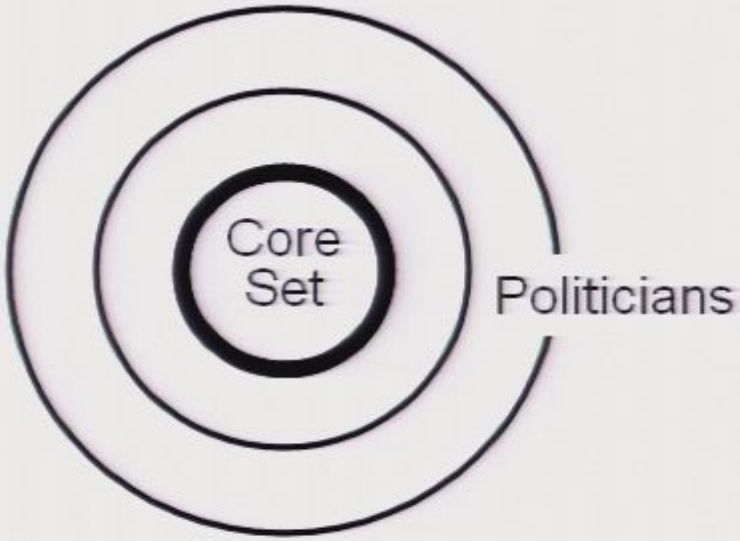
Joe Weber's 1996 publication

UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication

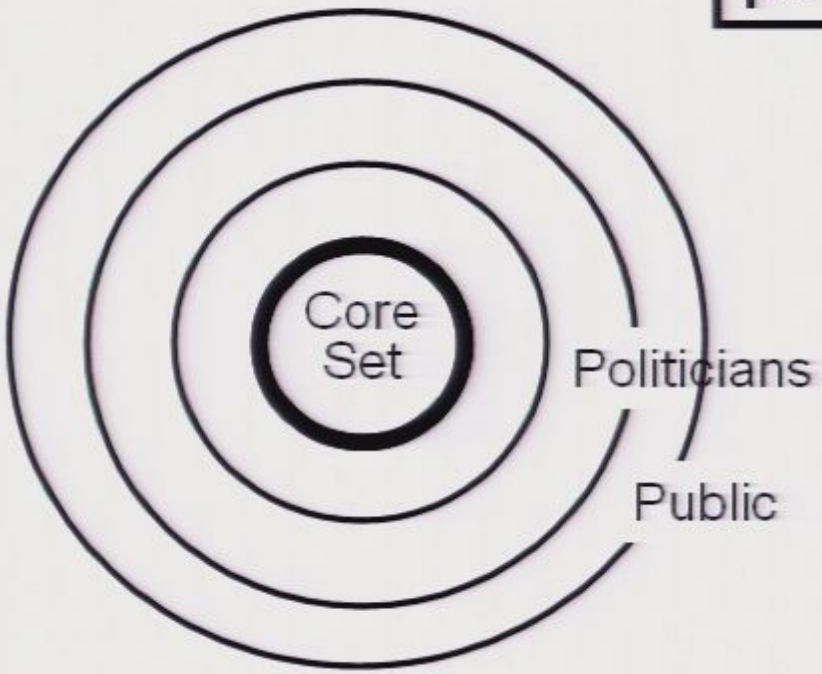


UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication



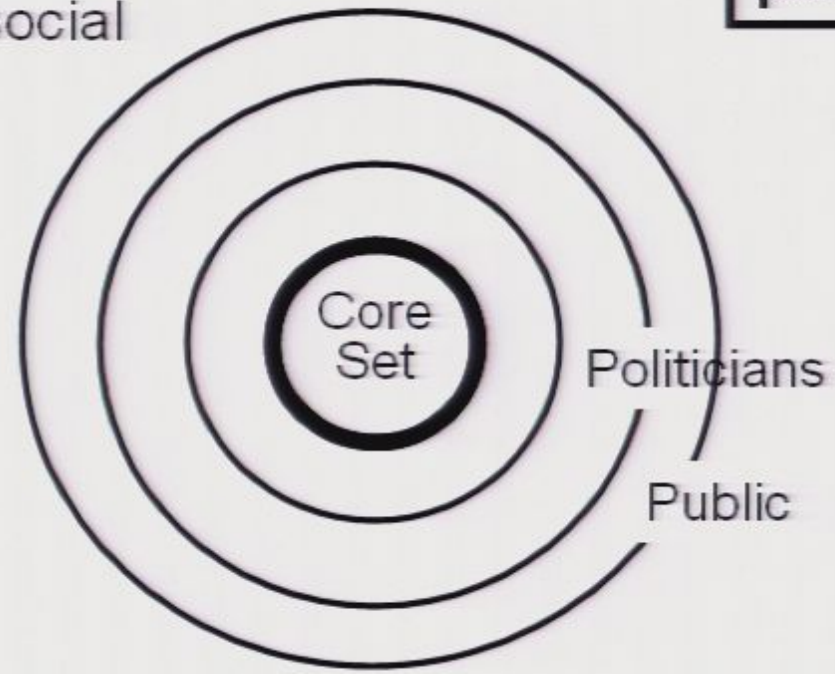
UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication

The problem is the outsiders not the insiders (where social control is strong)



UBIQUITOUS EXPERTISES

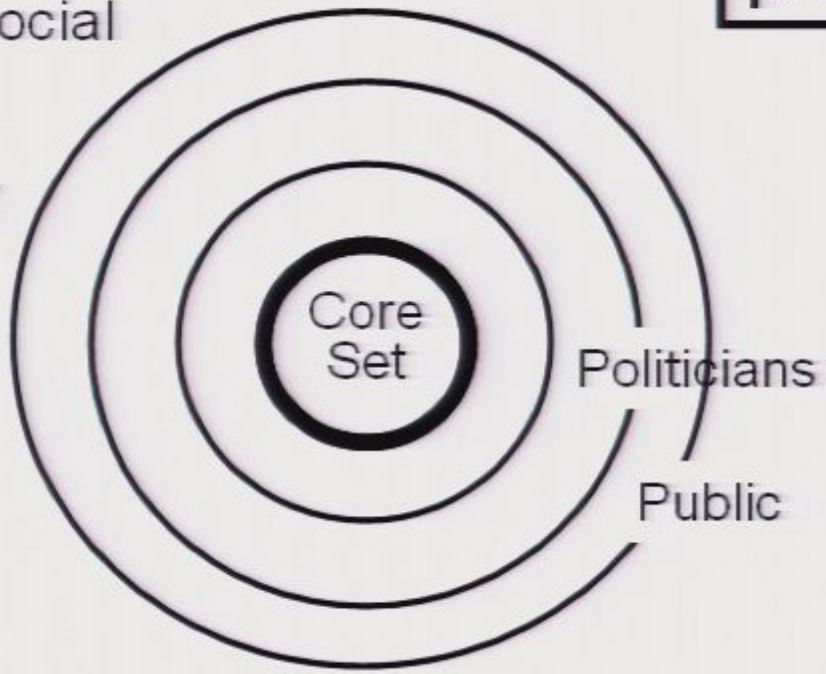
SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication

The problem is the outsiders not the insiders (where social control is strong)

Physics is an oral culture!



UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

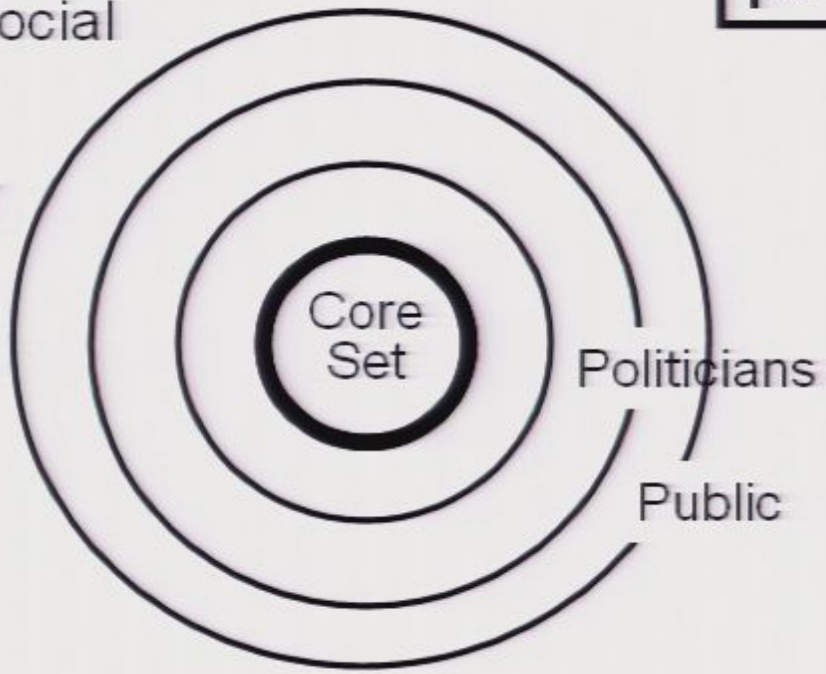
Only 3 people had read it!

Joe Weber's 1996 publication

The problem is the outsiders
not the insiders (where social
control is strong)

Physics is an oral culture!

Joe Weber and Barbara
Mikulski



UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

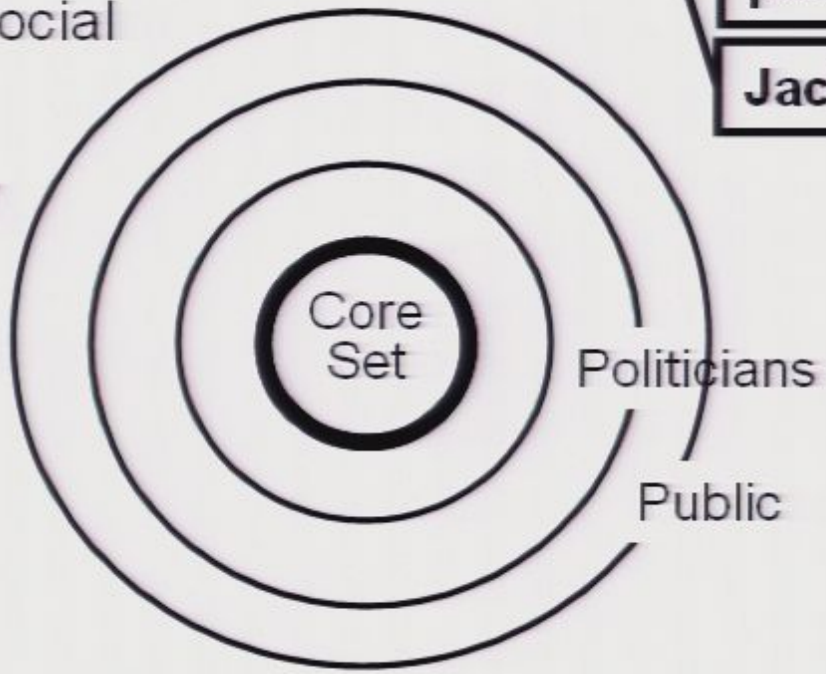
Joe Weber's 1996 publication

Jack Sarfatti et all

The problem is the outsiders not the insiders (where social control is strong)

Physics is an oral culture!

Joe Weber and Barbara Mikulski



UBIQUITOUS EXPERTISES

SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

Only 3 people had read it!

Joe Weber's 1996 publication

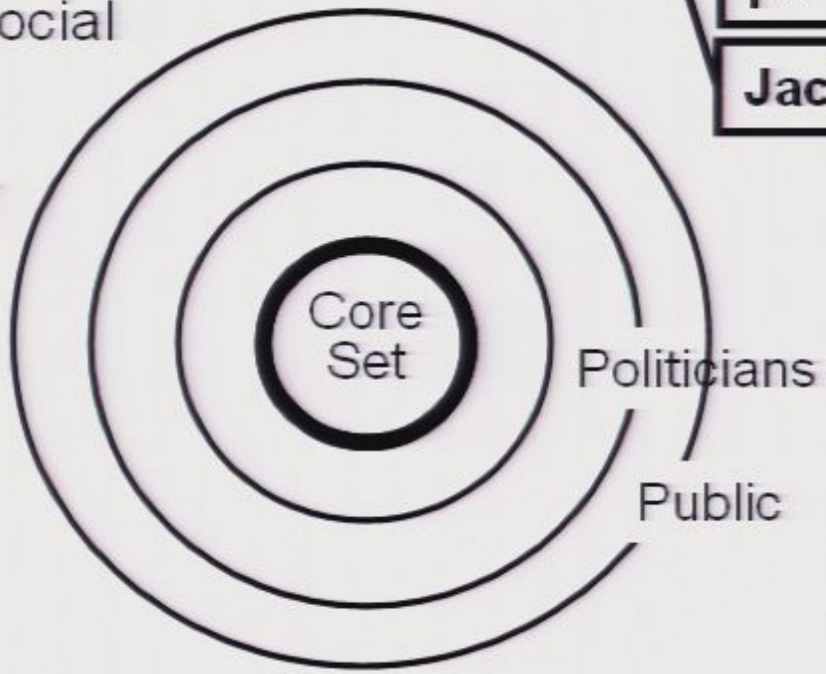
Jack Sarfatti et all

The problem is the outsiders not the insiders (where social control is strong)

Physics is an oral culture!

Joe Weber and Barbara Mikulski

The public and MMR vaccine



Primary Source Knowledge

Primary Source Knowledge and Technical Decision-Making: Mbeki and the AZT Debate

Martin Weinel

Primary Source Knowledge

Primary Source Knowledge and Technical Decision-Making: Mbeki and the AZT Debate
Martin Weinel

Mbeki had only primary source knowledge obtained from the internet

… many in our country have called on the Government to make the drug AZT available in our public health system. … There … exists a large volume of scientific literature alleging that, among other things, the toxicity of this drug is such that it is in fact a danger to health. … To understand this matter better, I would urge the Honourable Members of the National Council to access the huge volume of literature on this matter available on the Internet, so that all of us can approach this issue from the same base of information.

Primary Source Knowledge

Primary Source Knowledge and Technical Decision-Making: Mbeki and the AZT Debate
Martin Weinel

Mbeki had only primary source knowledge obtained from the internet

… many in our country have called on the Government to make the drug AZT available in our public health system. … There … exists a large volume of scientific literature alleging that, among other things, the toxicity of this drug is such that it is in fact a danger to health. … To understand this matter better, I would urge the Honourable Members of the National Council to access the huge volume of literature on this matter available on the Internet, so that all of us can approach this issue from the same base of information.

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

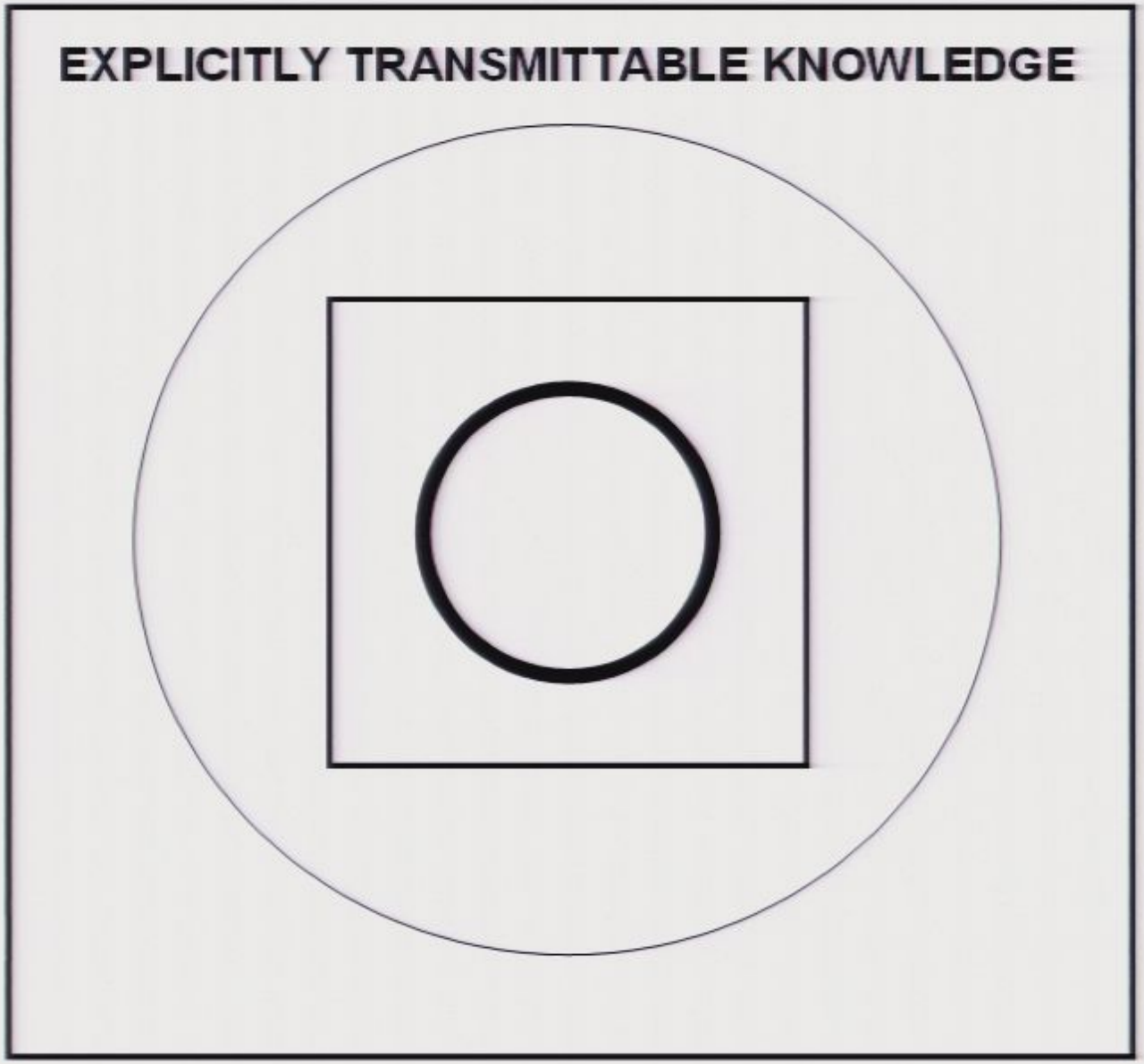
December 2007

PART 2

New analysis of tacit knowledge (and a note on artificial intelligence)

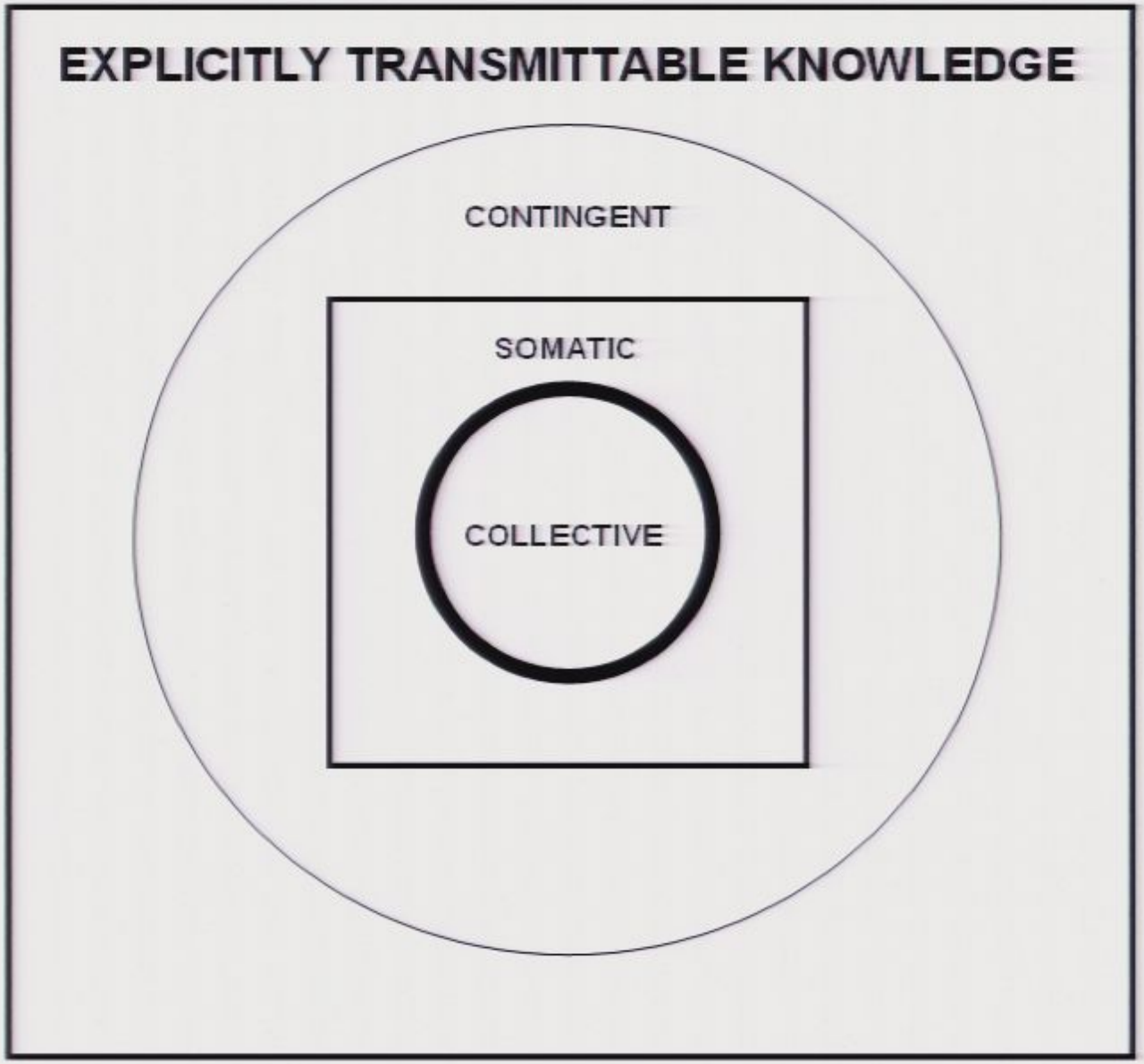
The terrain of tacit knowledge

From ms *Tacit and Explicit Knowledge*

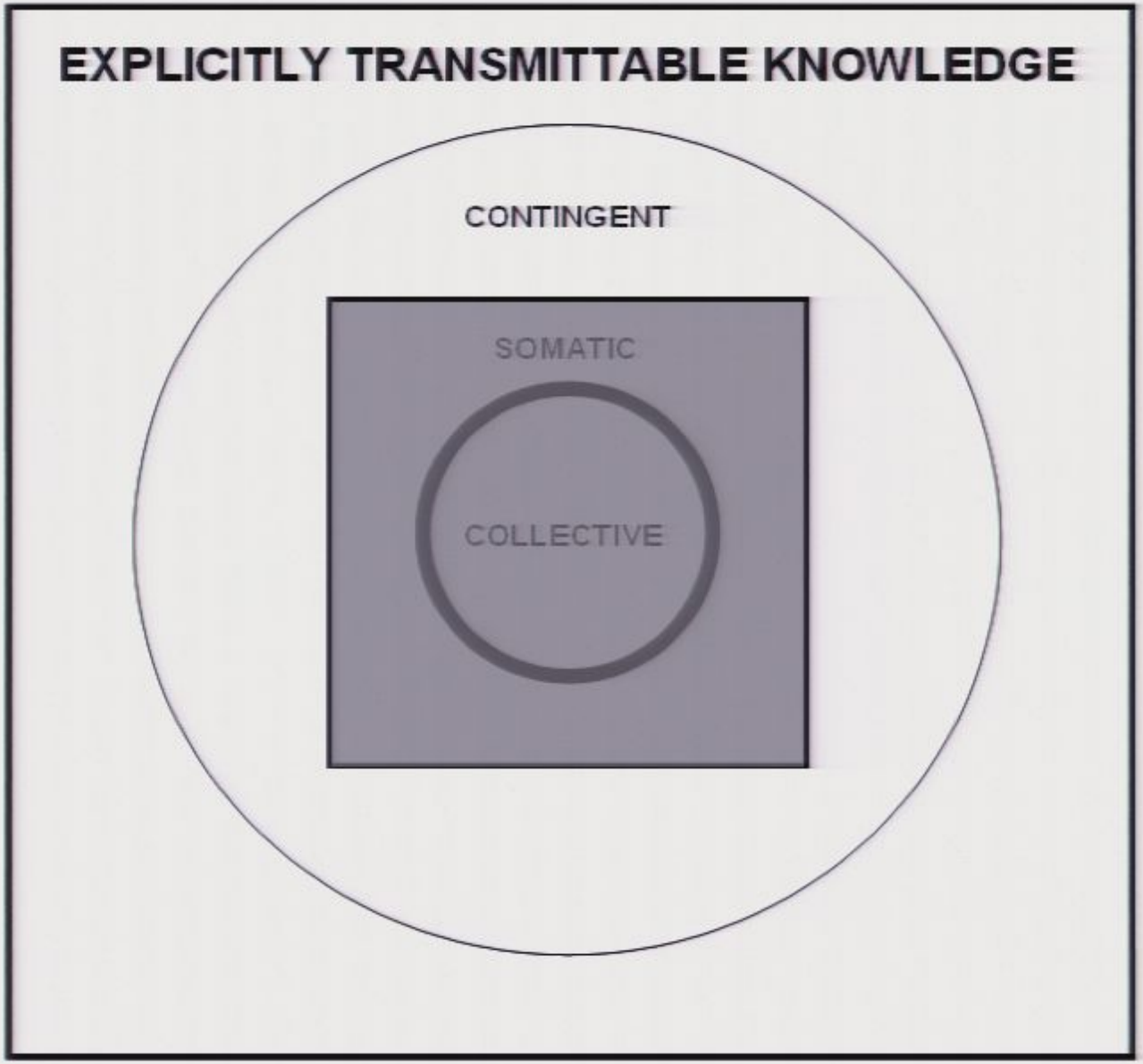


The terrain of tacit knowledge

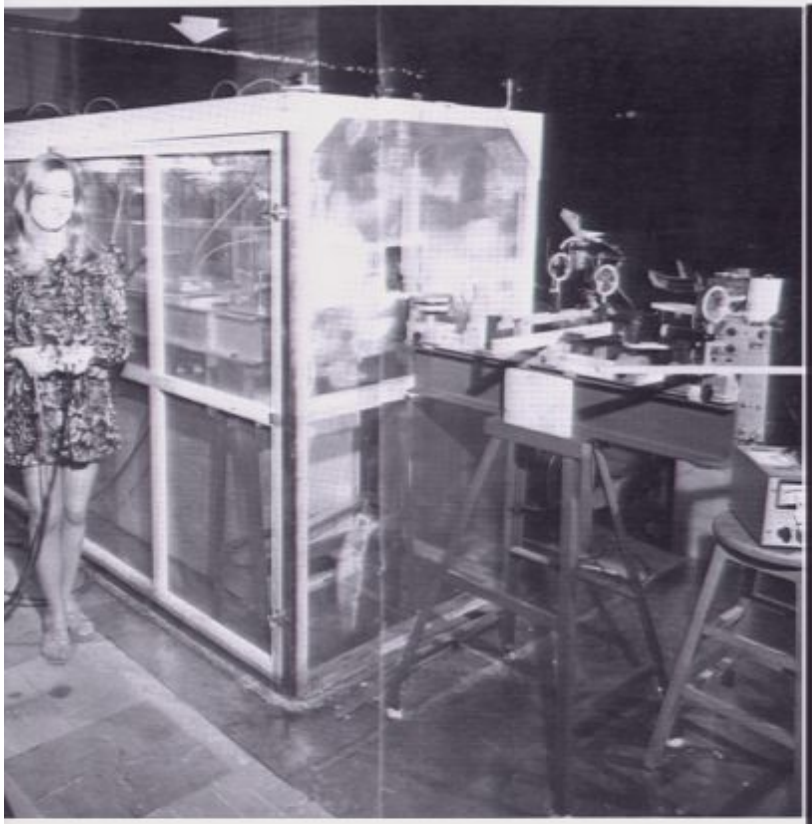
From ms *Tacit and Explicit Knowledge*

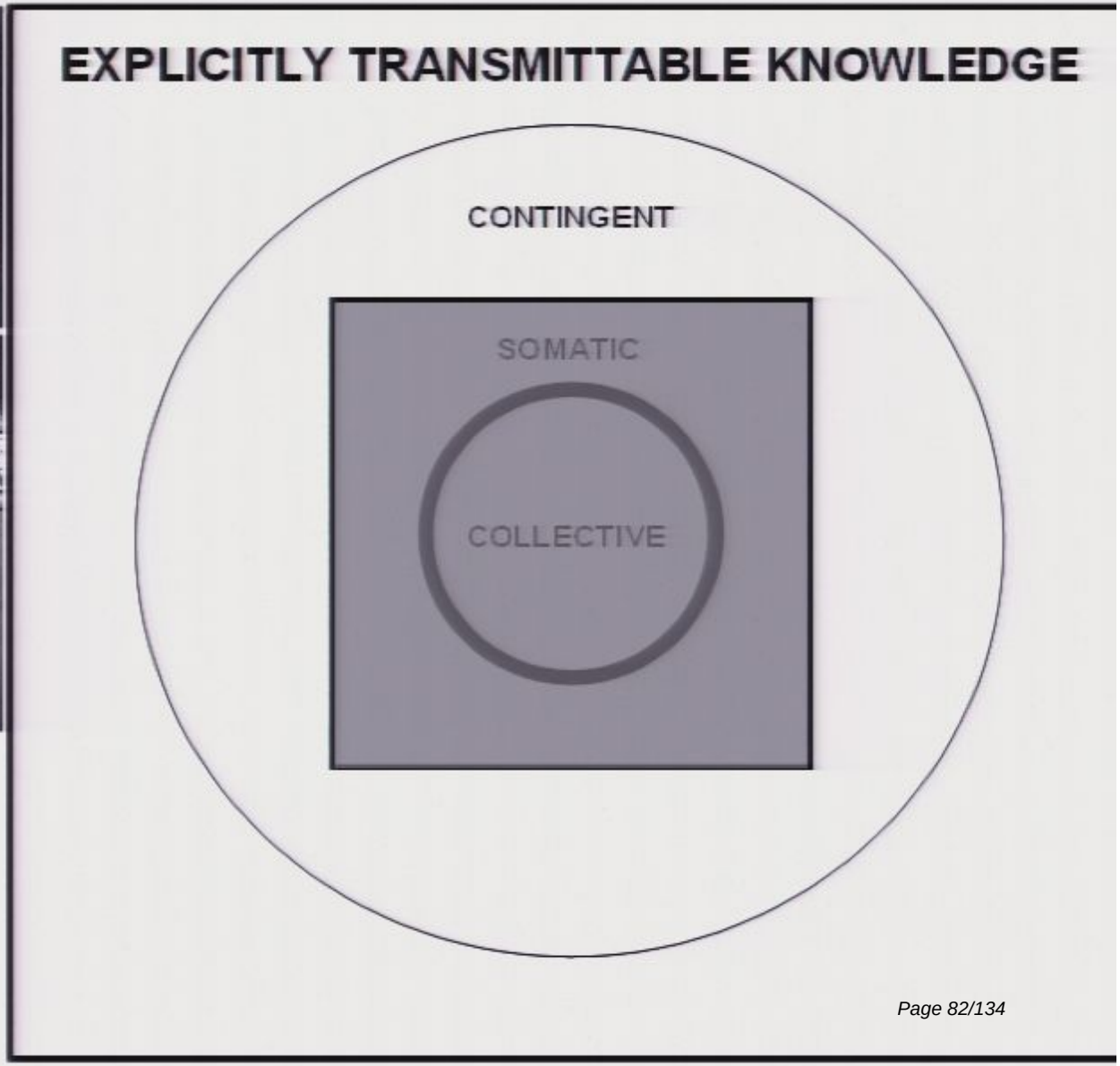


Contingent Tacit Knowledge



Contingent Tacit Knowledge





Who learned to make one

Who learned to make one

Only those who had personal contact with another successful laser builder managed to build a working model

Who learned to make one

Only those who had personal contact with another successful laser builder managed to build a working model

Those who used the literature alone failed even though they built something that followed the circuit diagram

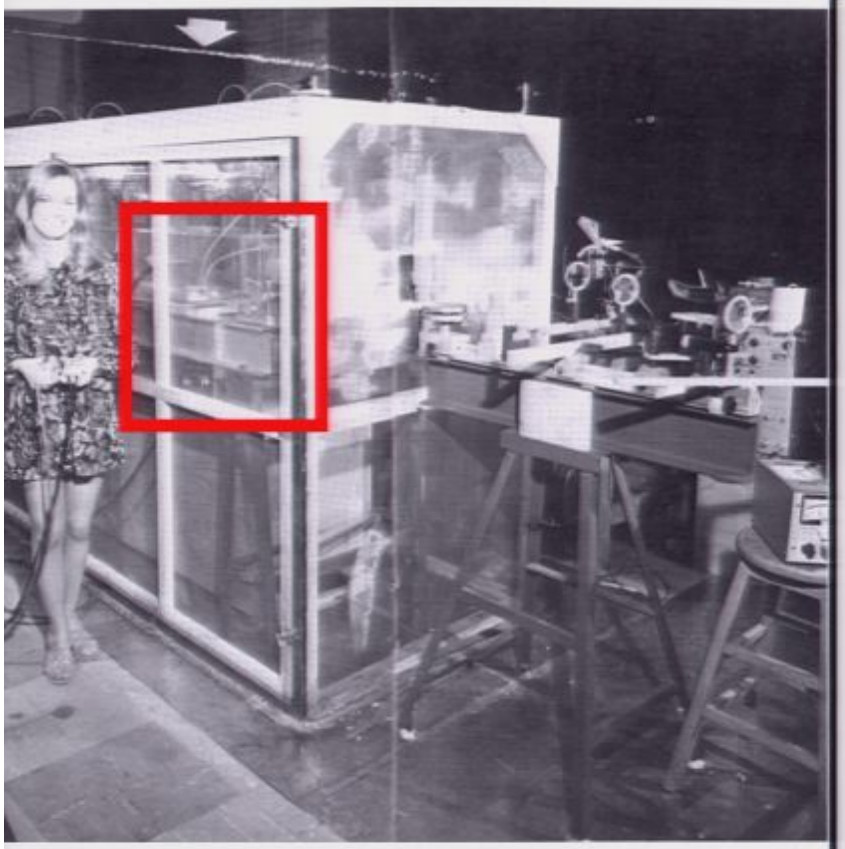
Who learned to make one

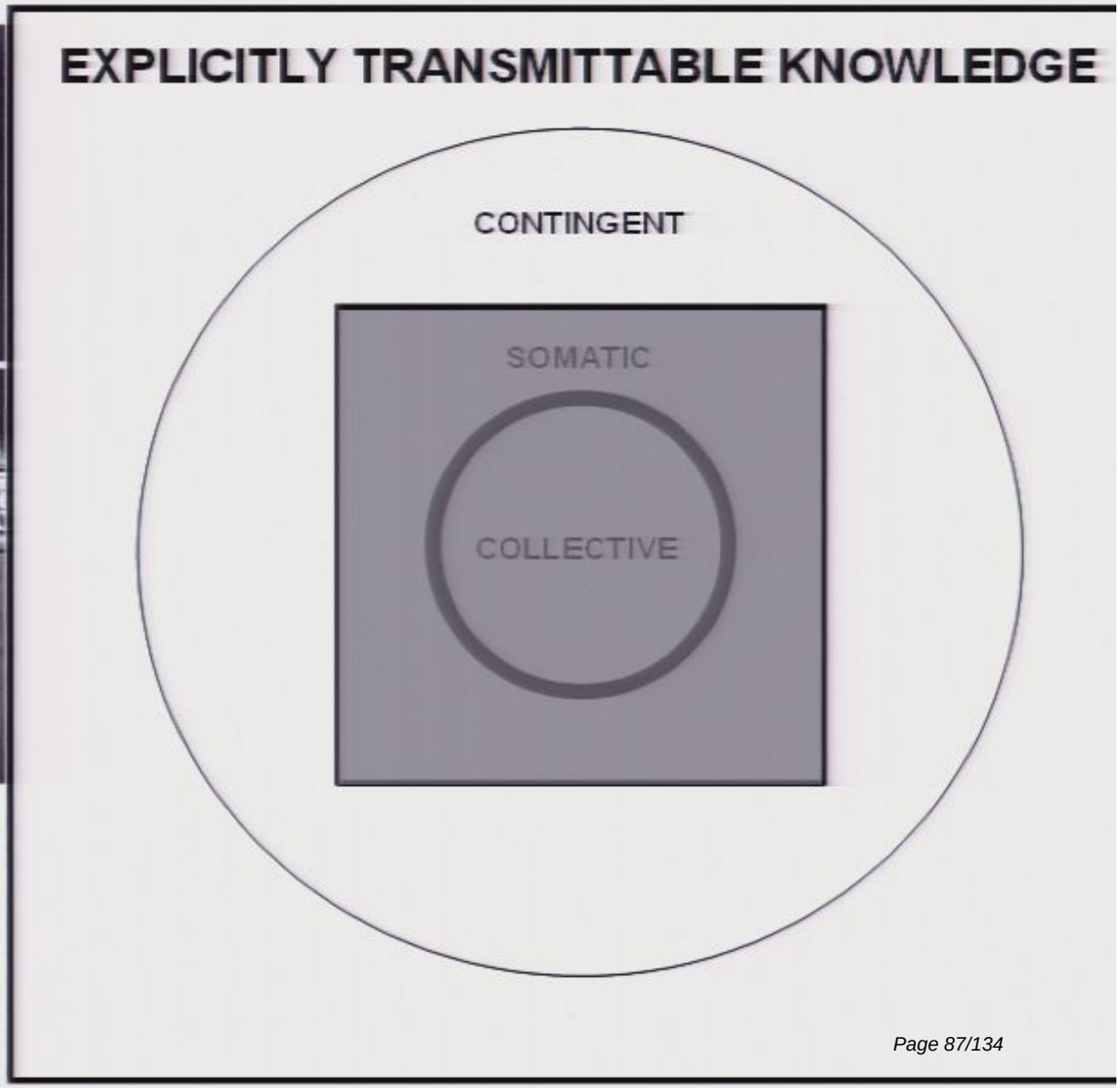
Only those who had personal contact with another successful laser builder managed to build a working model

Those who used the literature alone failed even though they built something that followed the circuit diagram

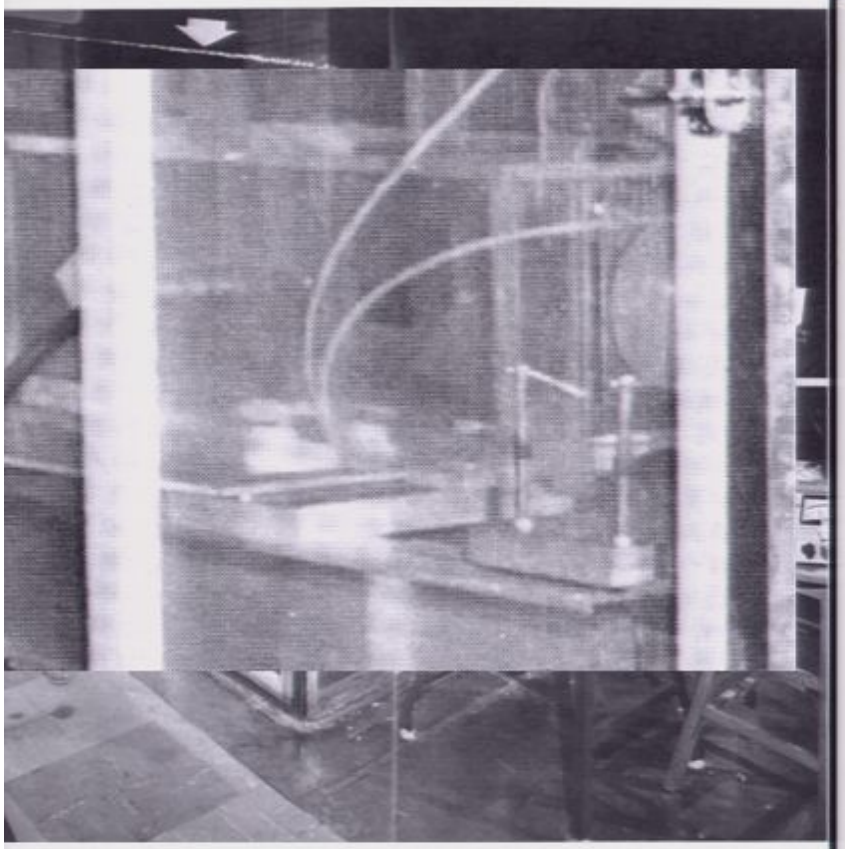
To make the laser work – **to make concrete smoke** – one of the team had to spend time with people who could already do it

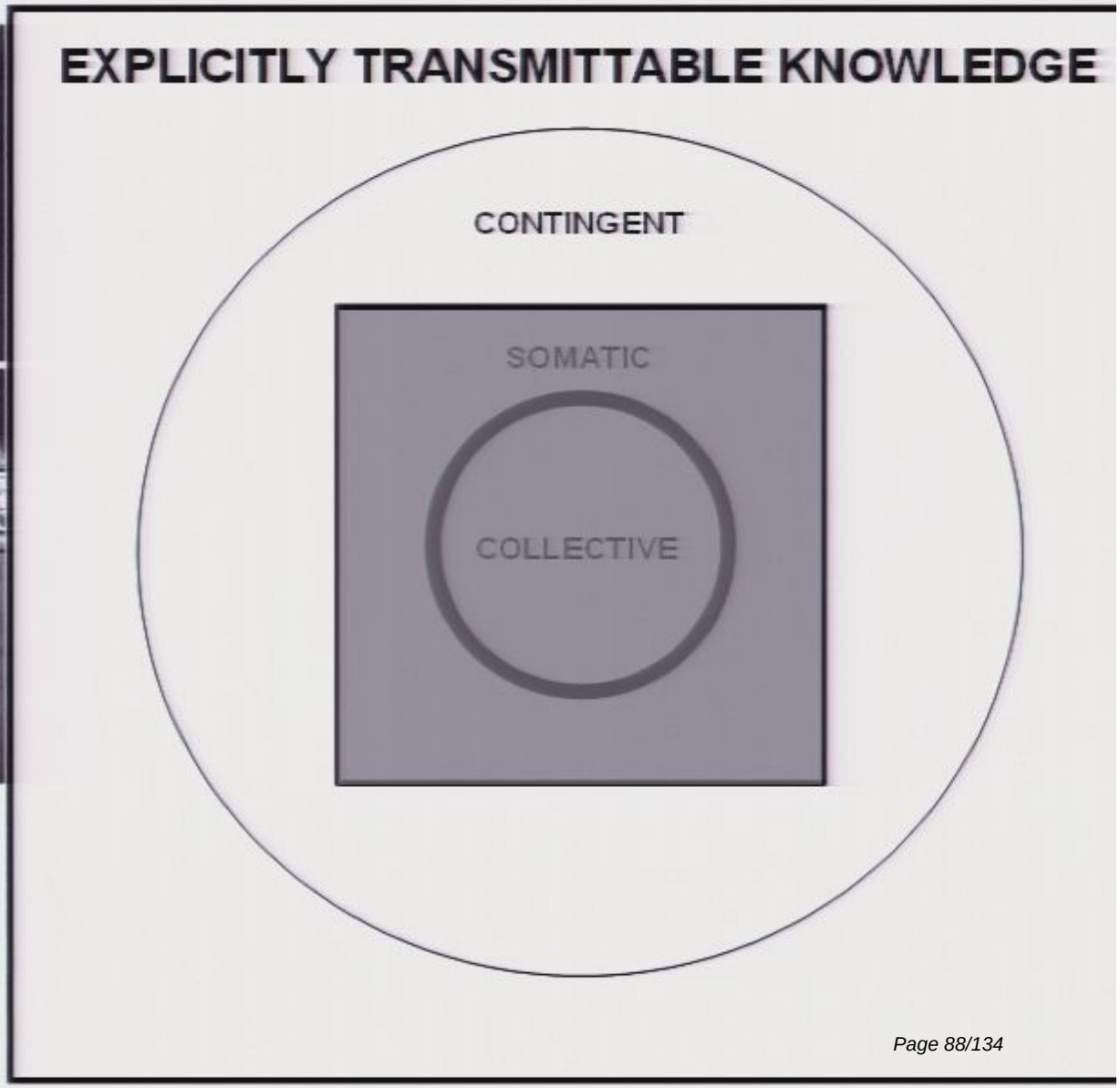
Contingent Tacit Knowledge



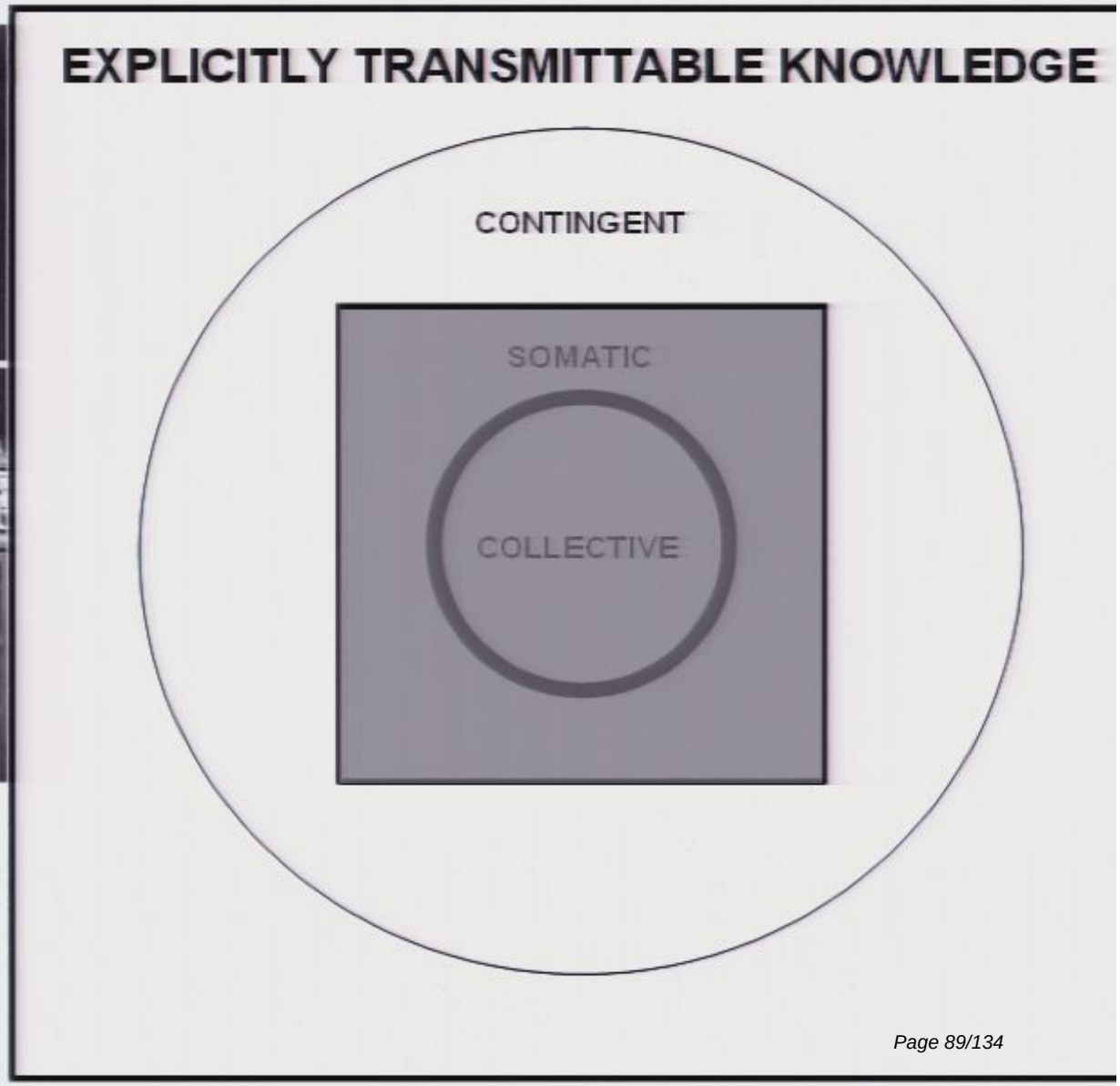


Contingent Tacit Knowledge

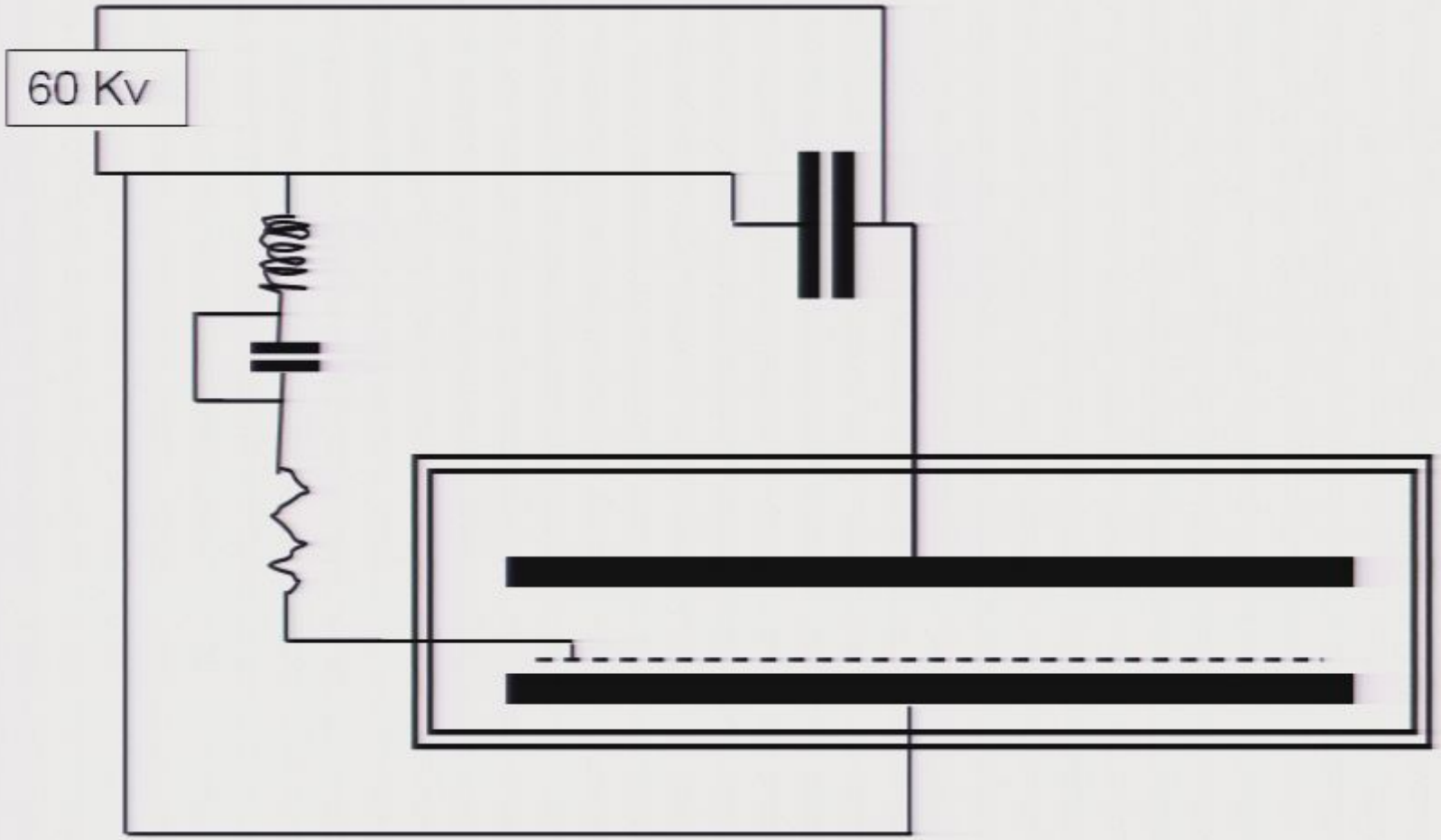




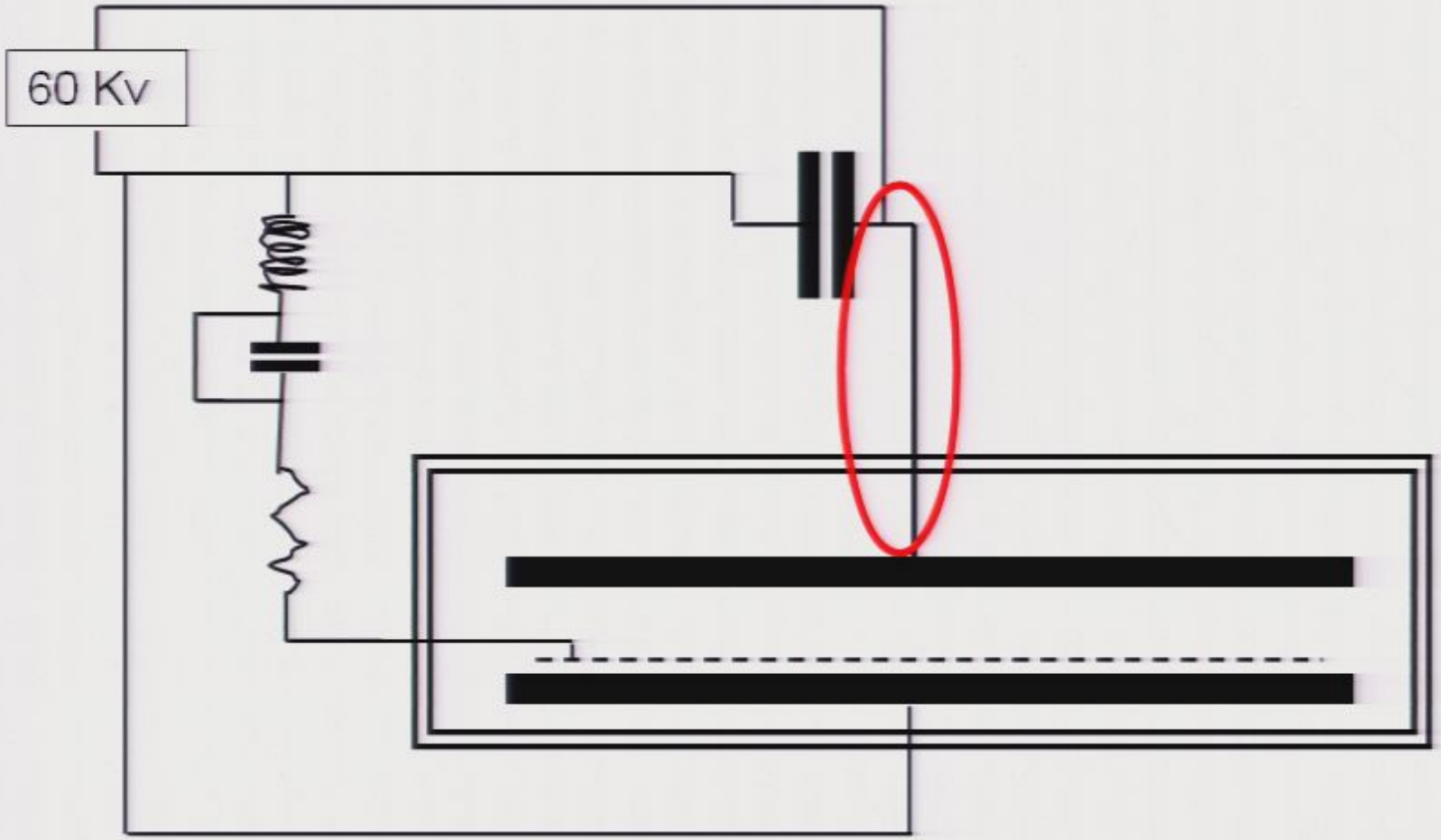
Contingent Tacit Knowledge



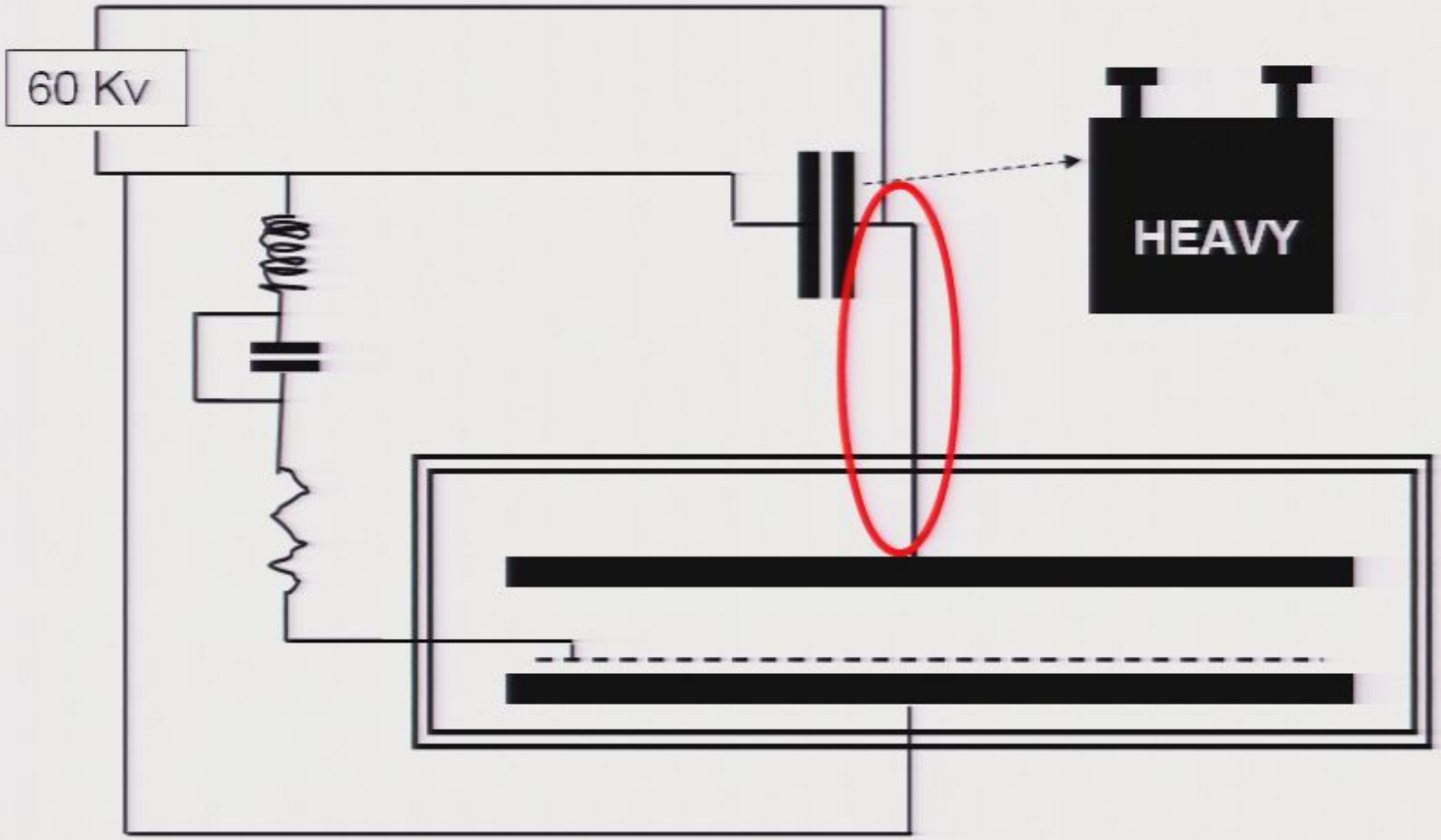
TEA-laser circuit diagram and practice



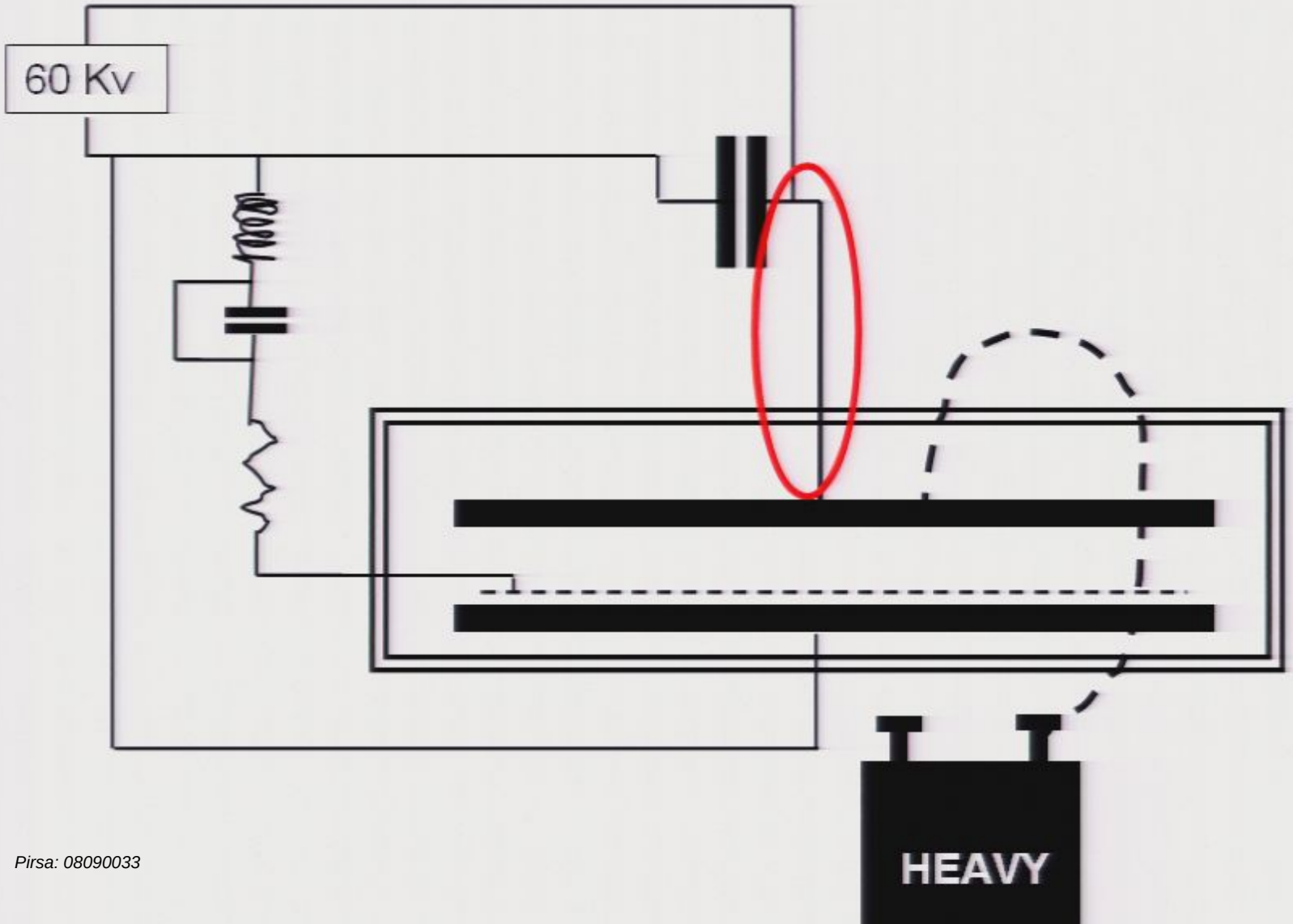
TEA-laser circuit diagram and practice



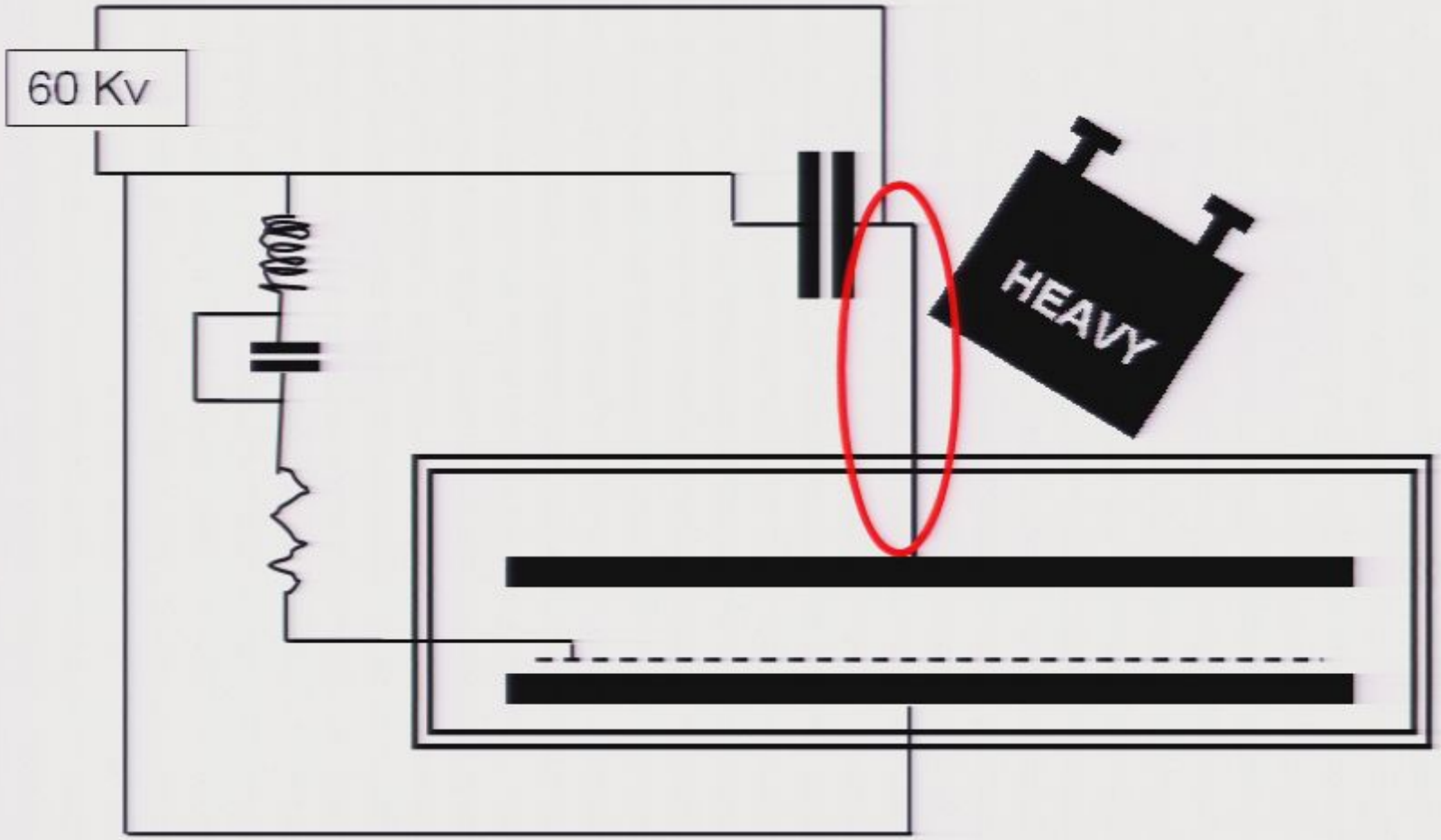
TEA-laser circuit diagram and practice



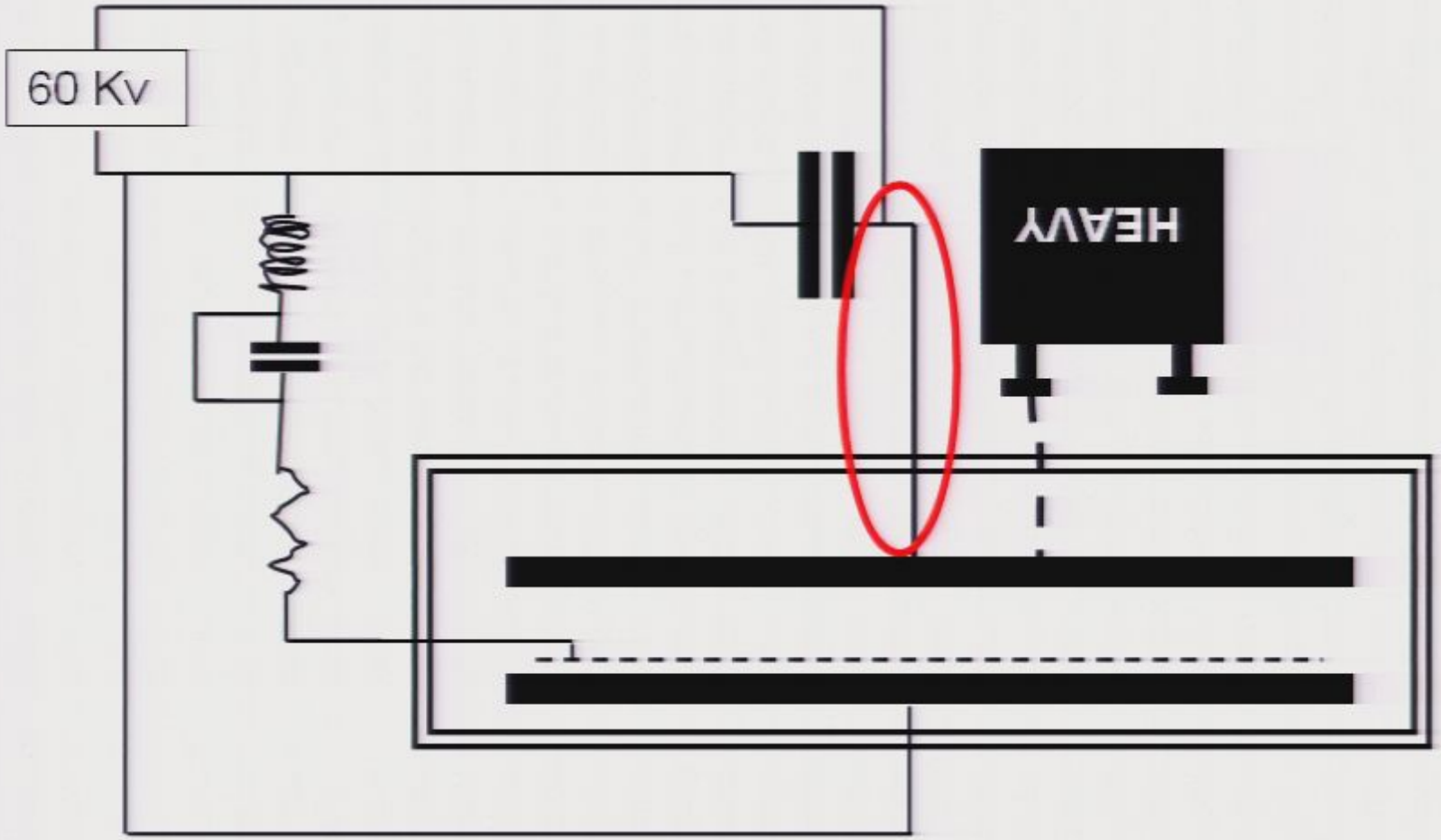
TEA-laser circuit diagram and practice



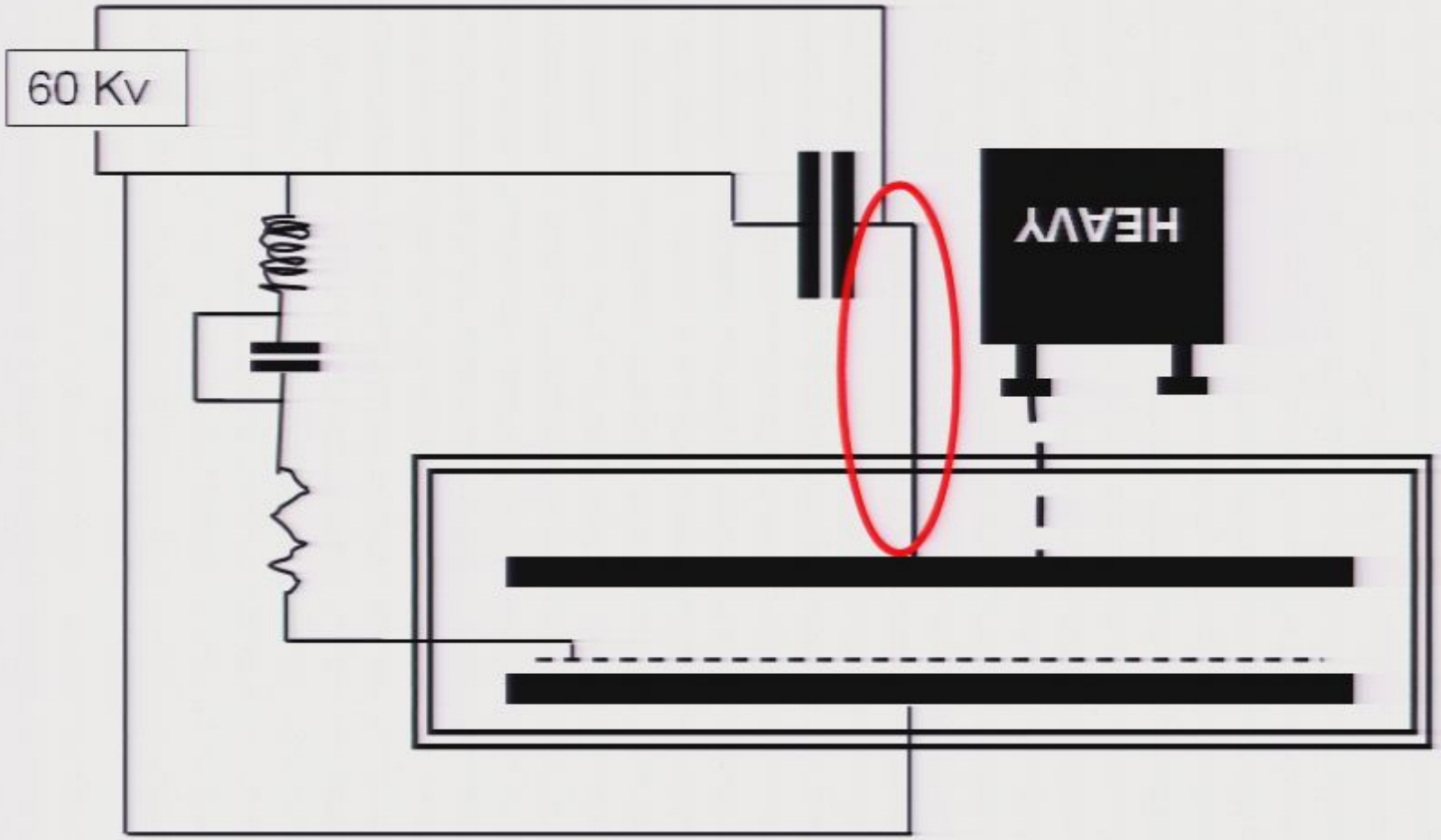
TEA-laser circuit diagram and practice



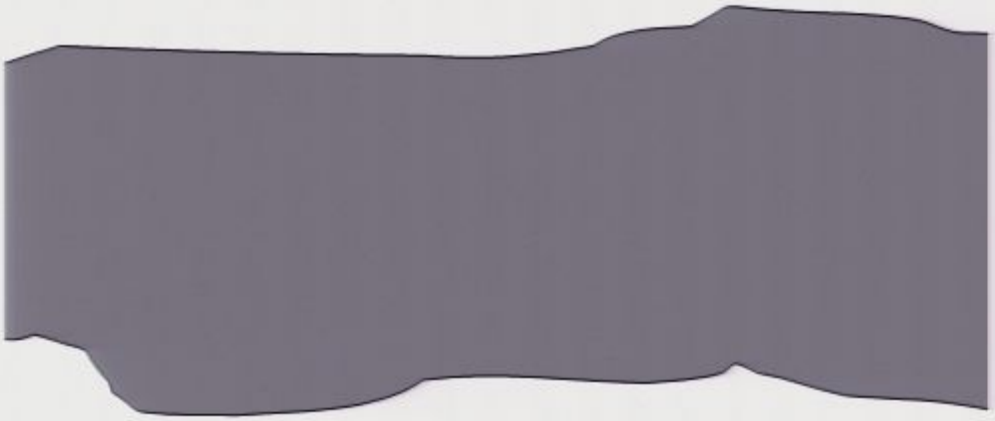
TEA-laser circuit diagram and practice



TEA-laser circuit diagram and practice

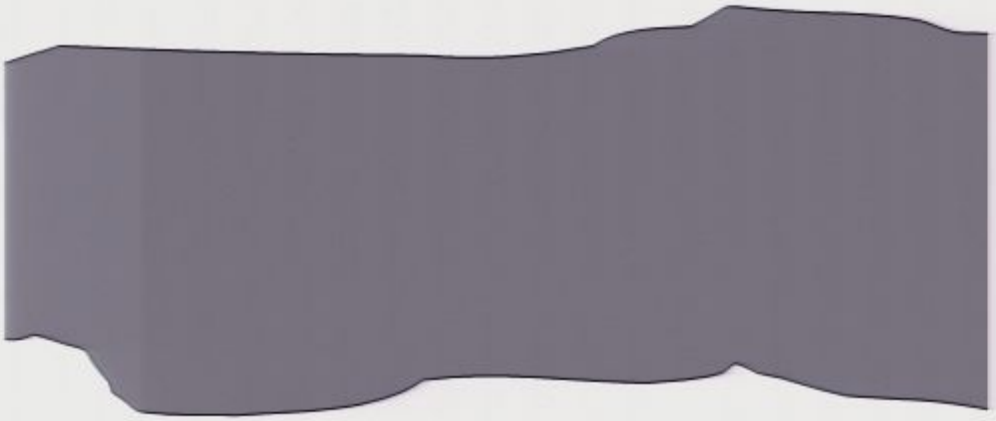


Explicability of contingent TK



Uncognized knowledge

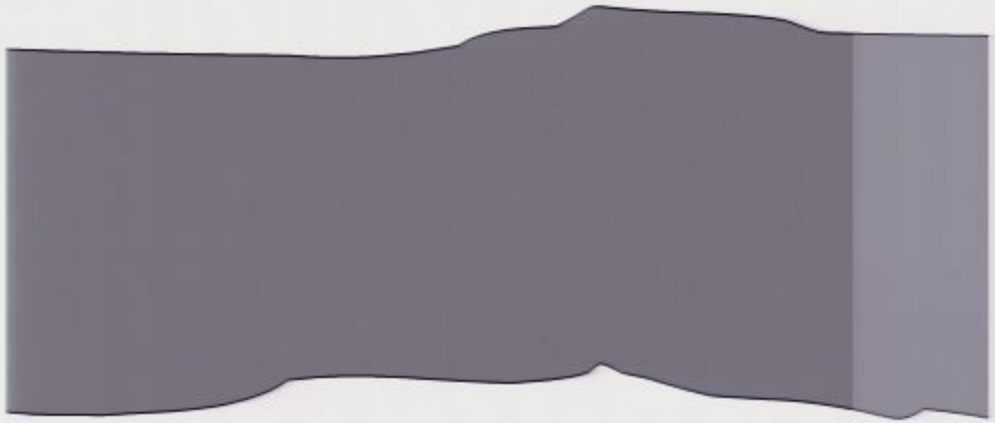
Explicability of contingent TK



Uncognized knowledge

Science gets done

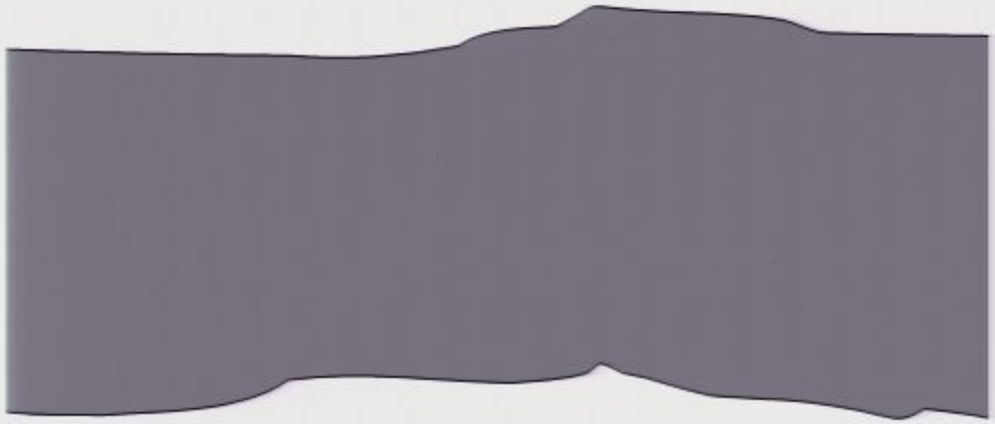
Explicability of contingent TK



Uncognized knowledge

Science gets done

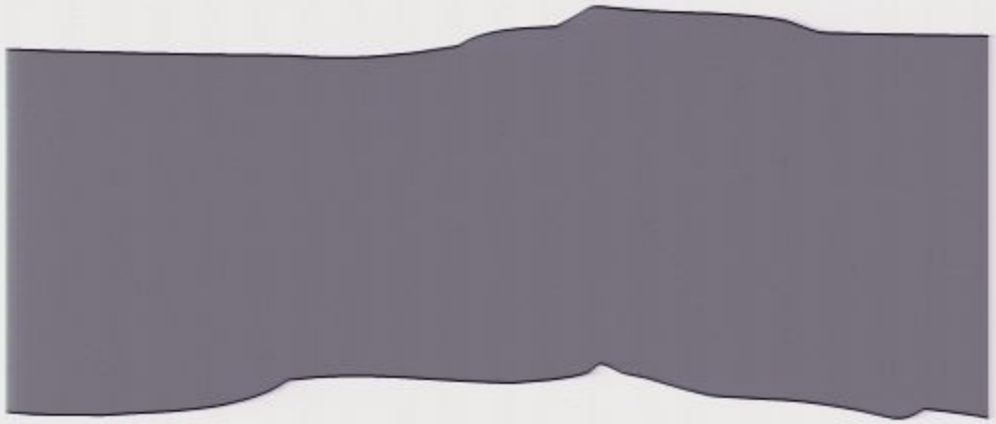
Explicability of contingent TK



Uncognized knowledge

Science gets done

Explicability of contingent TK

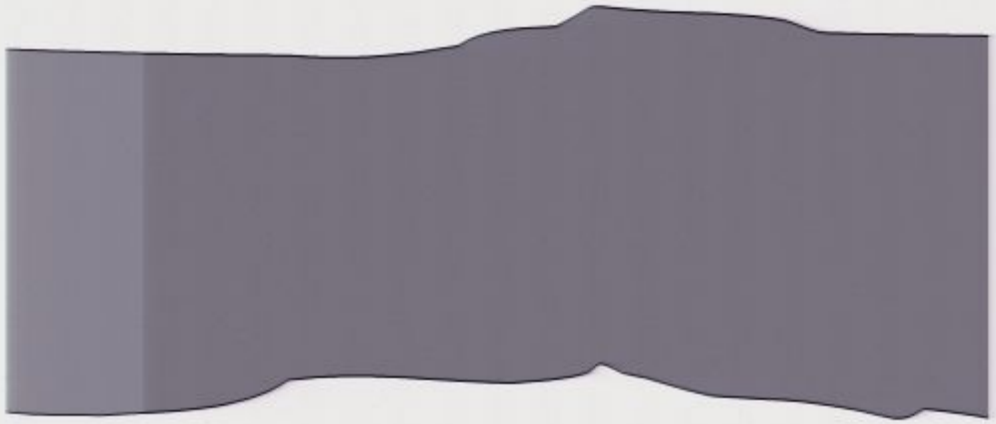


Uncognized knowledge

Concealed knowledge

Science gets done

Explicability of contingent TK



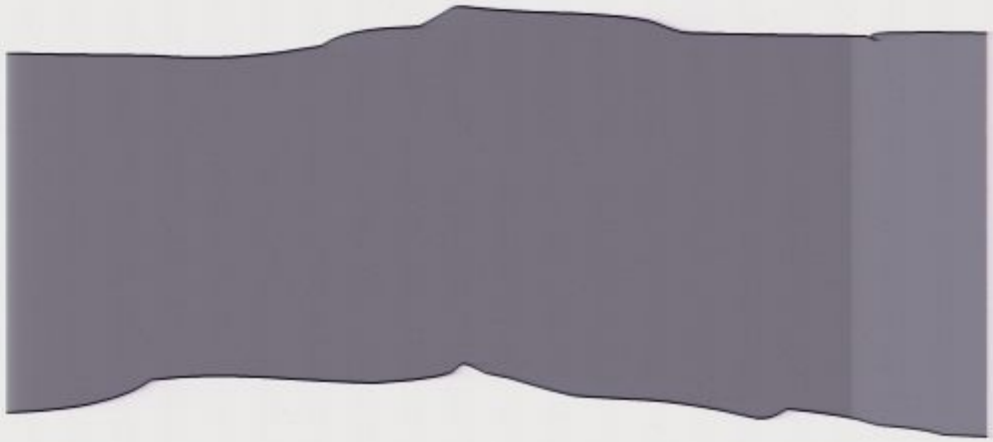
Uncognized knowledge

Concealed knowledge

Science gets done

Some people become less secretive

Explicability of contingent TK



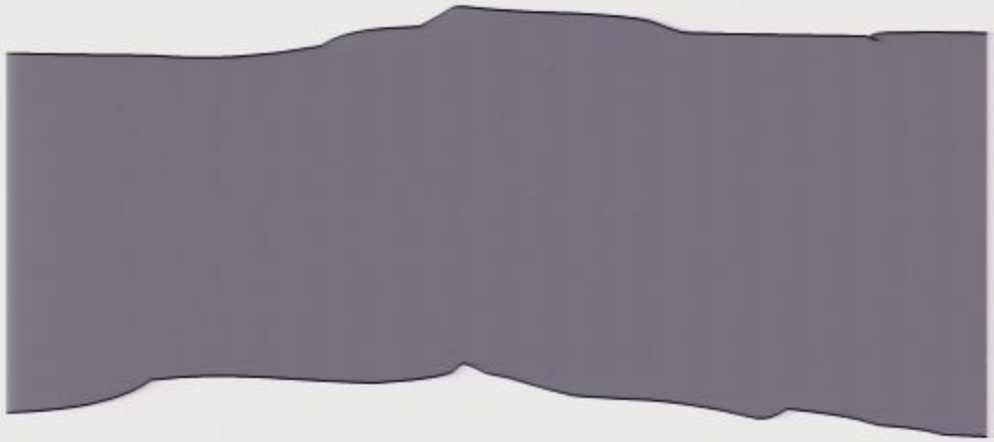
Uncognized knowledge

Concealed knowledge

Science gets done

Some people become less secretive

Explicability of contingent TK



Uncognized knowledge

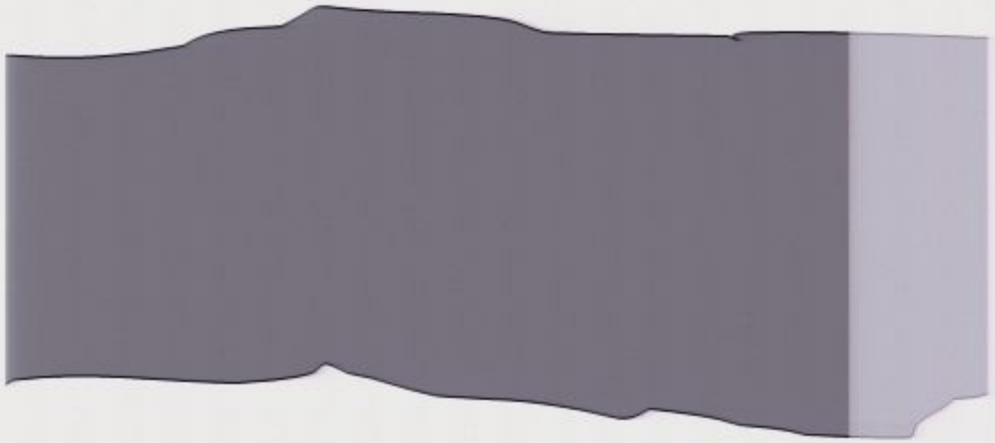
Concealed knowledge

Mismatched saliences

Science gets done

Some people become less secretive

Explicability of contingent TK



Uncognized knowledge

Concealed knowledge

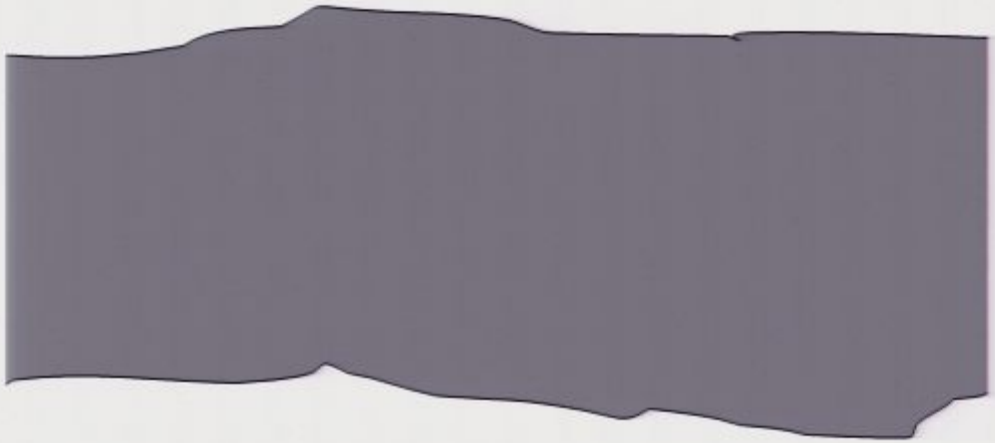
Mismatched saliences

Science gets done

Some people become less secretive

Some people get to know other people better

Explicability of contingent TK



Uncognized knowledge

Concealed knowledge

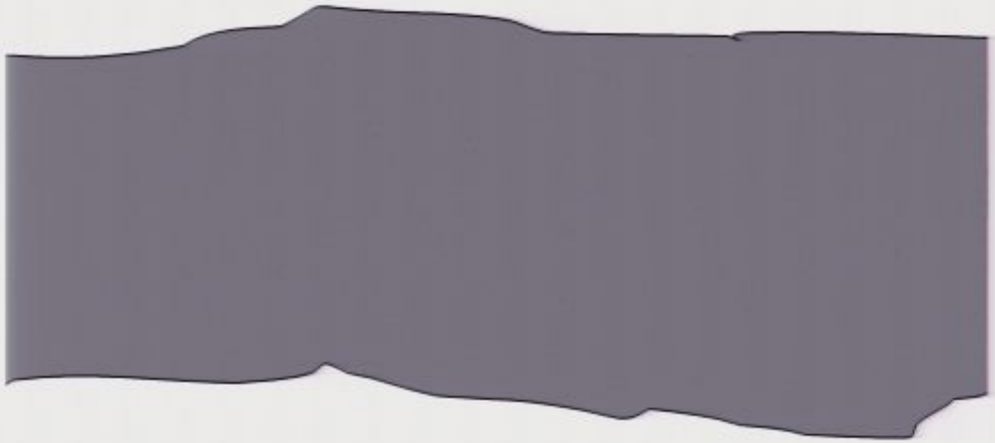
Mismatched saliences

Science gets done

Some people become less secretive

Some people get to know other people better

Explicability of contingent TK



Uncognized knowledge

Concealed knowledge

Mismatched saliences

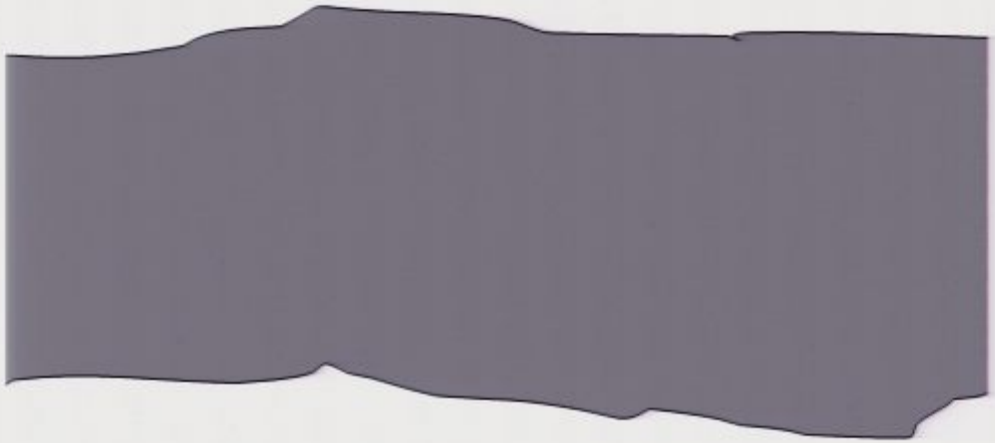
Science gets done

Some people become less secretive

Some people get to know other people better

Knowledge elicitation for expert systems is the attempt to make all the grey become white

Explicability of contingent TK



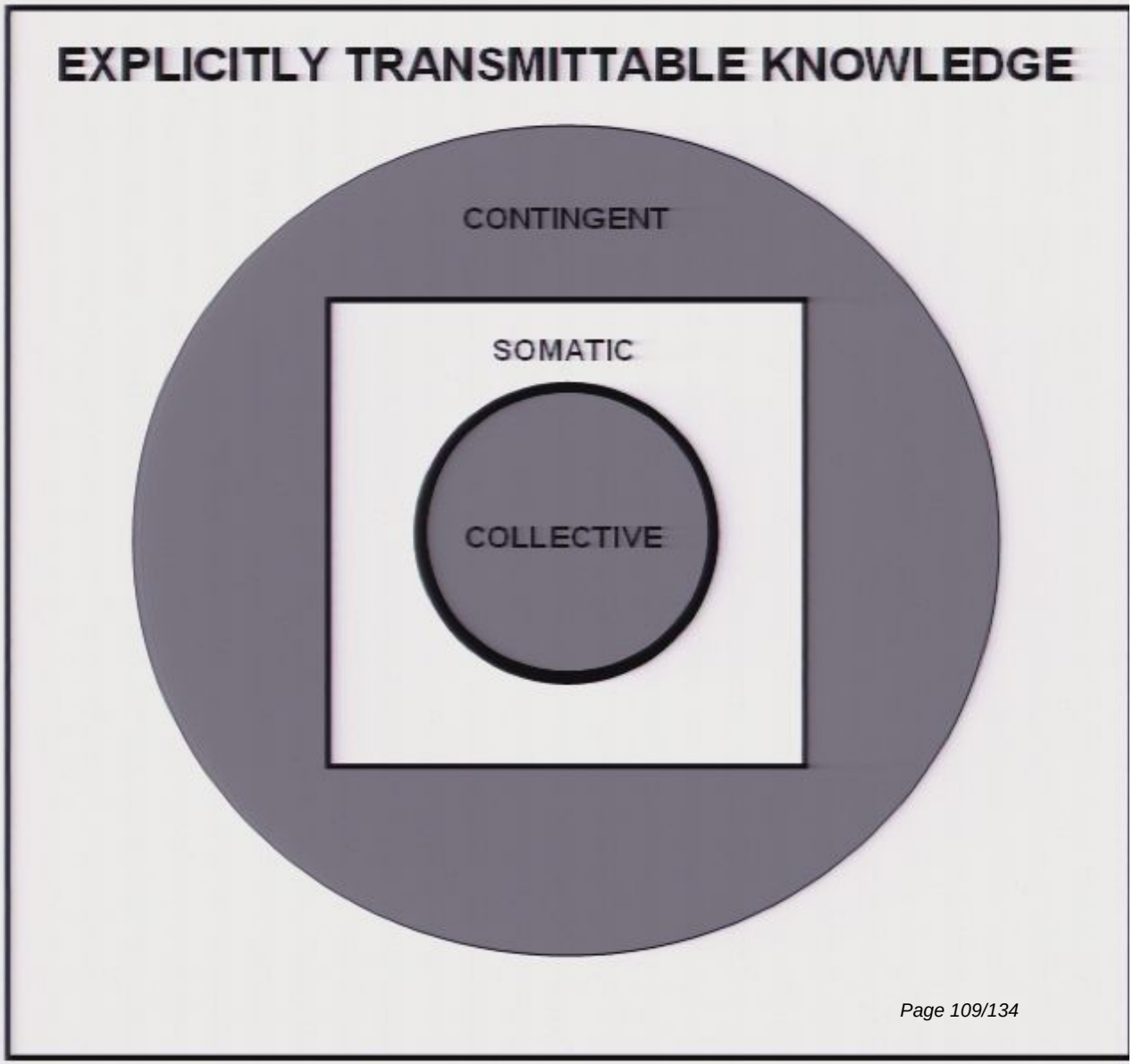
Uncognized knowledge	**Science gets done**
Concealed knowledge	**Some people become less secretive**
Mismatched saliences	**Some people get to know other people better**

Knowledge elicitation for expert systems is the attempt to make all the grey become white

But can't ever be achieved for social and logistic reasons

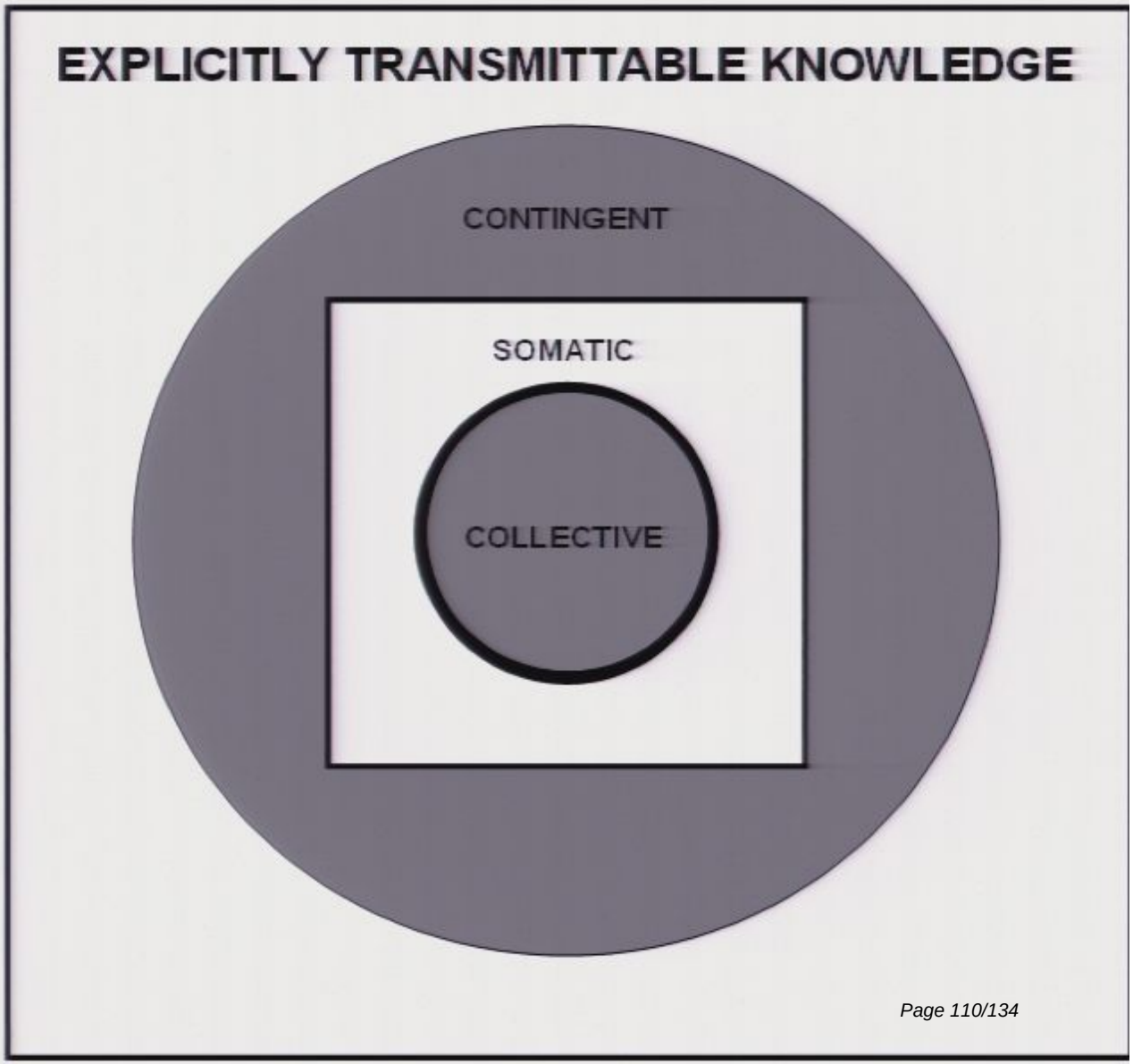
The terrain of tacit knowledge

Polanyi and the bicycle



The terrain of tacit knowledge

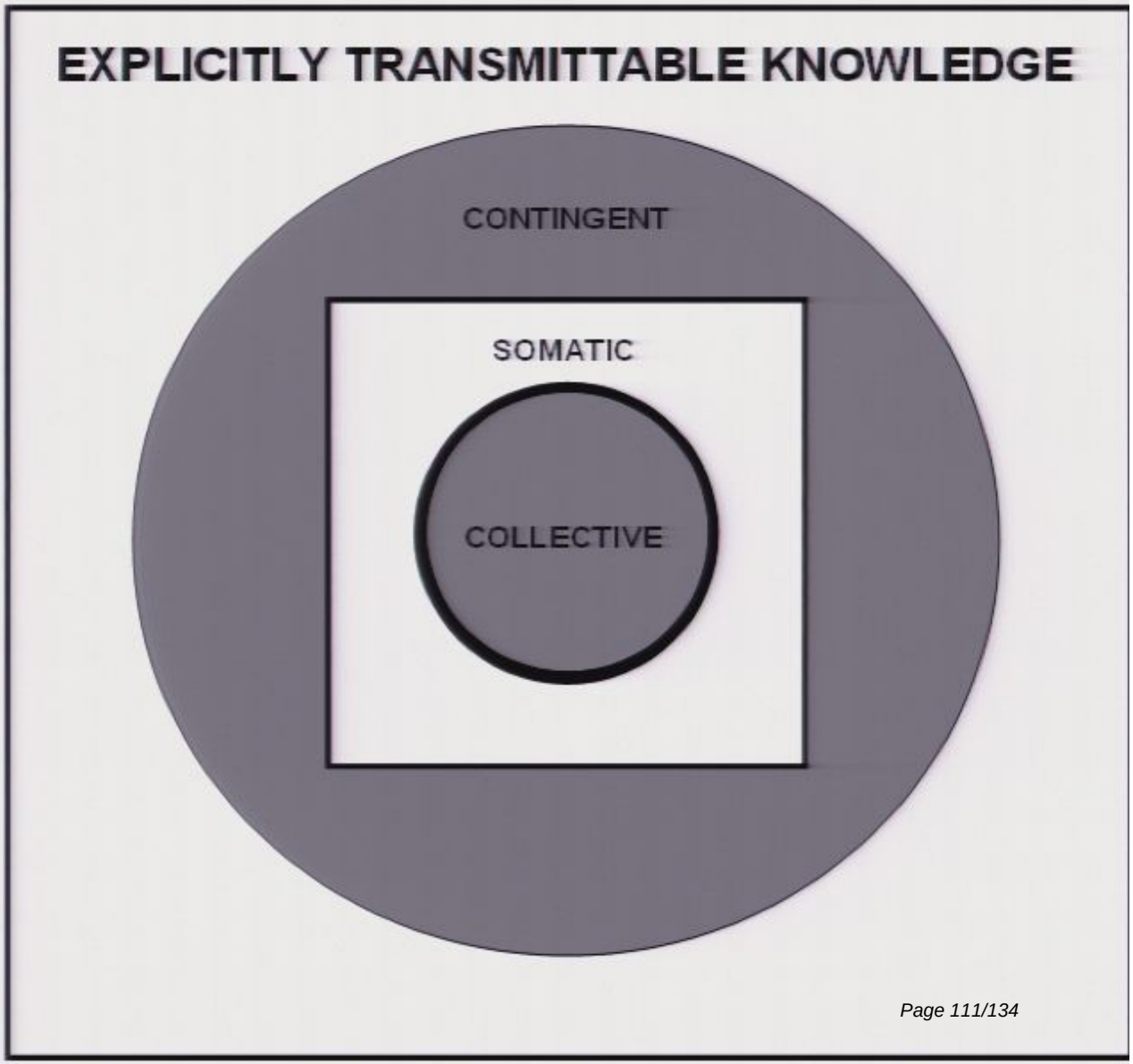
Polanyi and the bicycle



The terrain of tacit knowledge

Polanyi and the bicycle

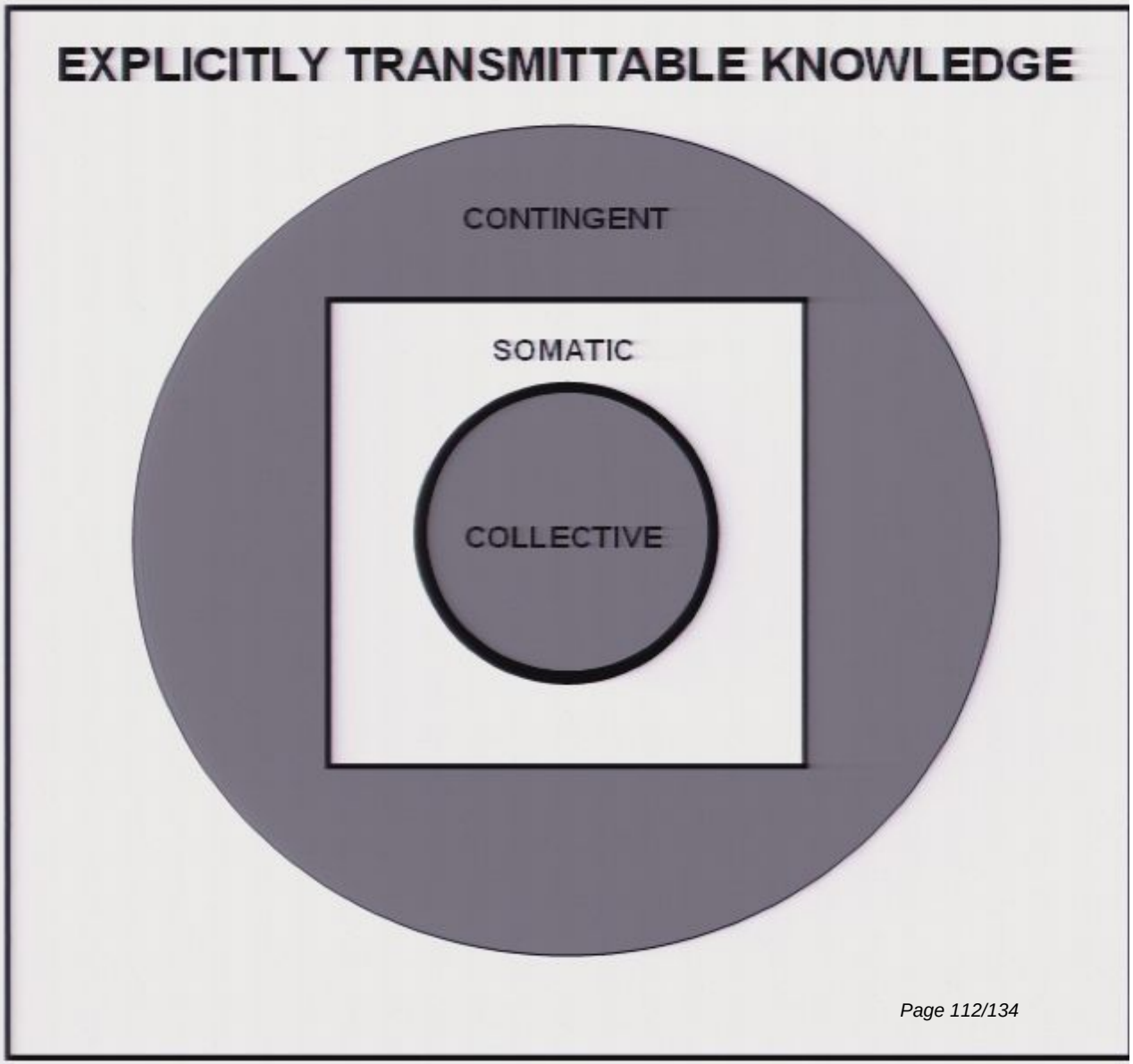
f I know how to ride a bicycle...,
his does not mean that I can tell
ow I manage to keep my
alance on a bicycle... . I may
ot have the slightest idea of
ow I do this, or even an entirely
vrong or grossly imperfect idea
f it, and yet go on cycling ...
nerrily. [p. 4] Polanyi, M., *The*
ogic of Tacit Inference



The terrain of tacit knowledge
Polanyi and the bicycle

..(I)n order to compensate for a given angle of imbalance α we must take a curve on the side of the imbalance, of which the radius (r) should be proportionate to the square of the velocity (v) over the imbalance r~v2/α [pp. 6–7]

Polanyi, M., *The Logic of Tacit Inference.*

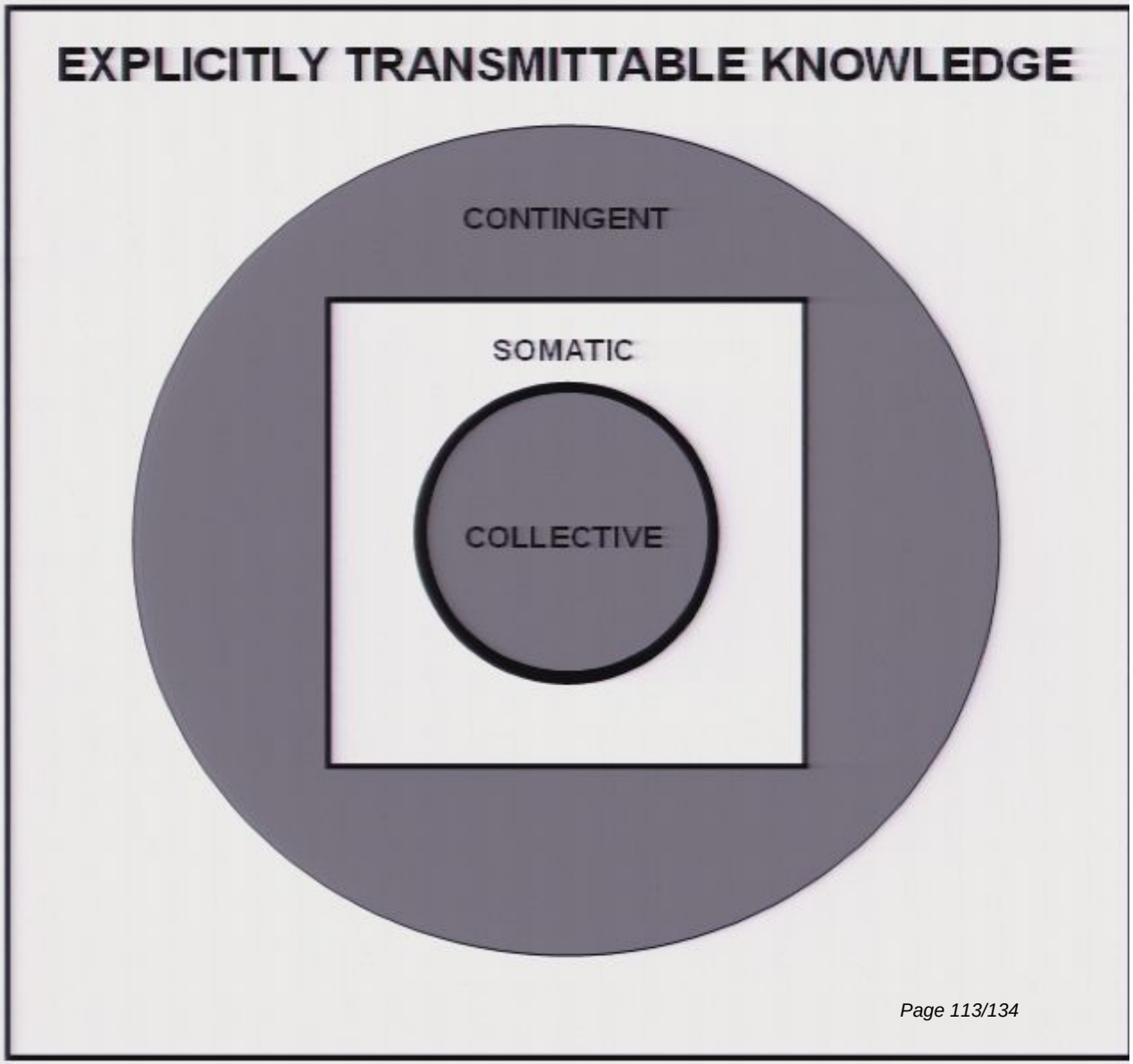


The terrain of tacit knowledge
Polanyi and the bicycle

Bicycle balancing

..(I)n order to compensate for a given angle of imbalance α we must take a curve on the side of the imbalance, of which the adius (r) should be proportionate to the square of he velocity (v) over the mbalance r~v2/α [pp. 6–7]

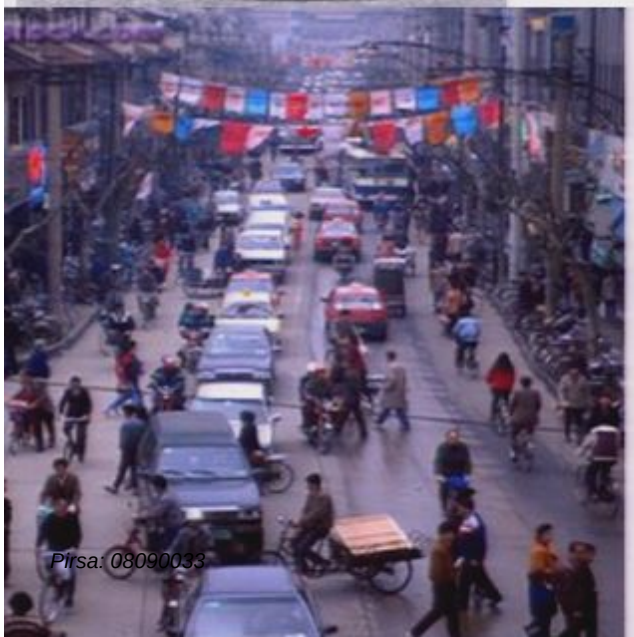
Polanyi, M., *The Logic of Tacit nference.*



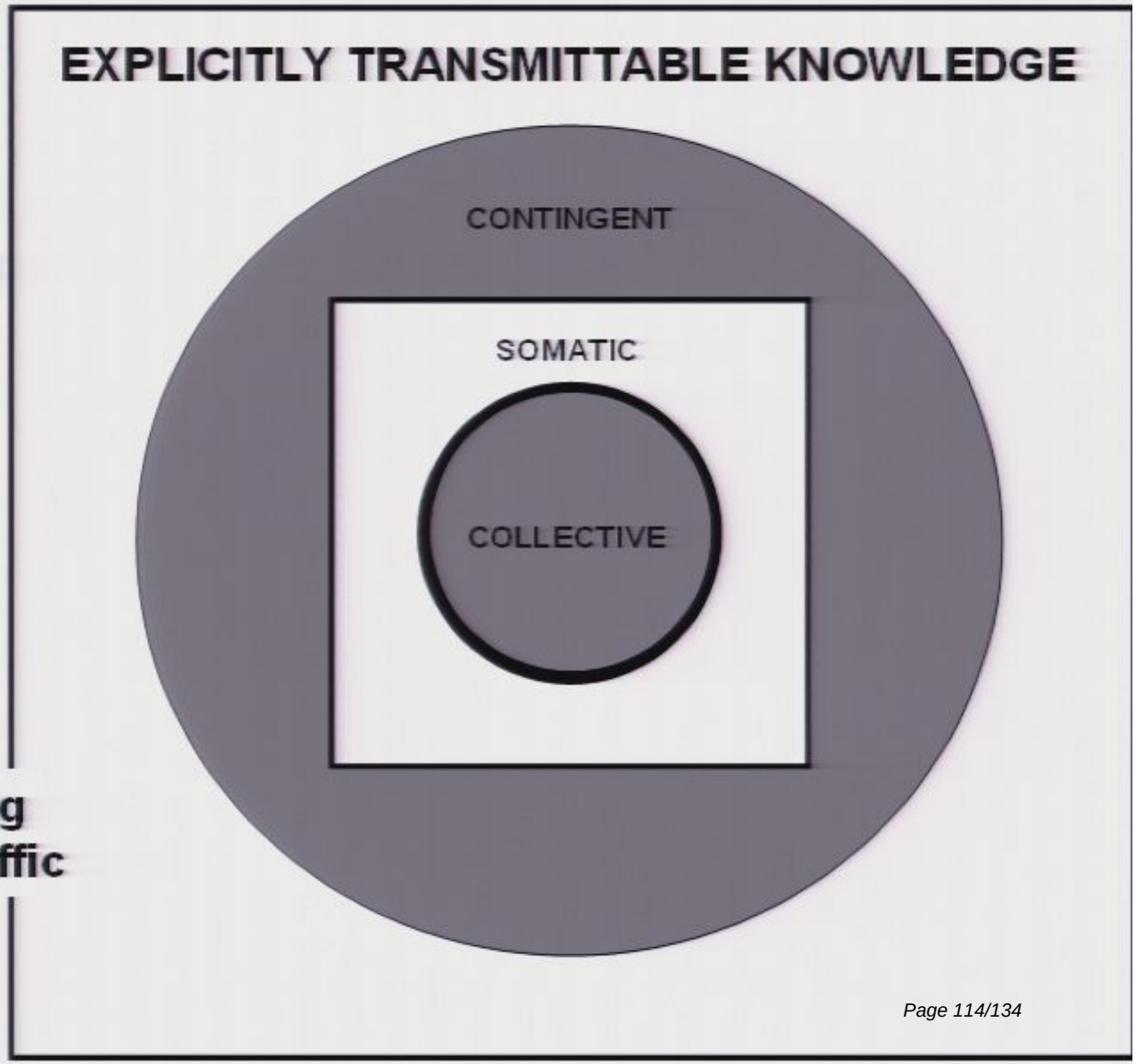
The terrain of tacit knowledge

From ms *Tacit and Explicit Knowledge*

Bicycle balancing



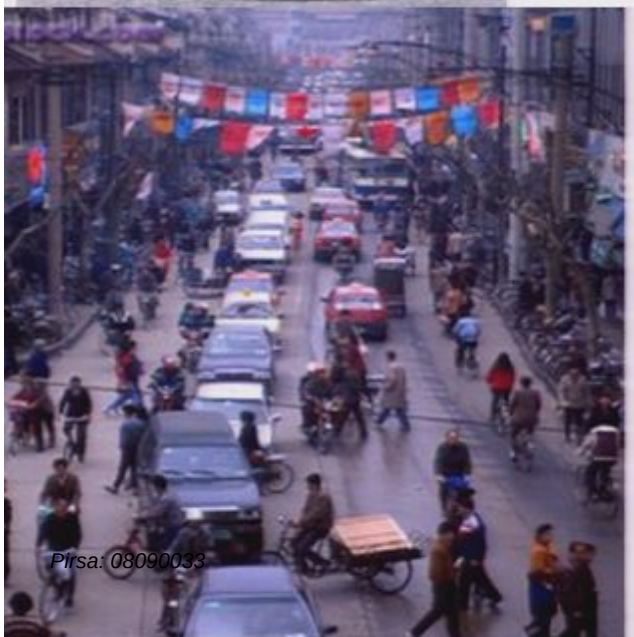
Riding in traffic



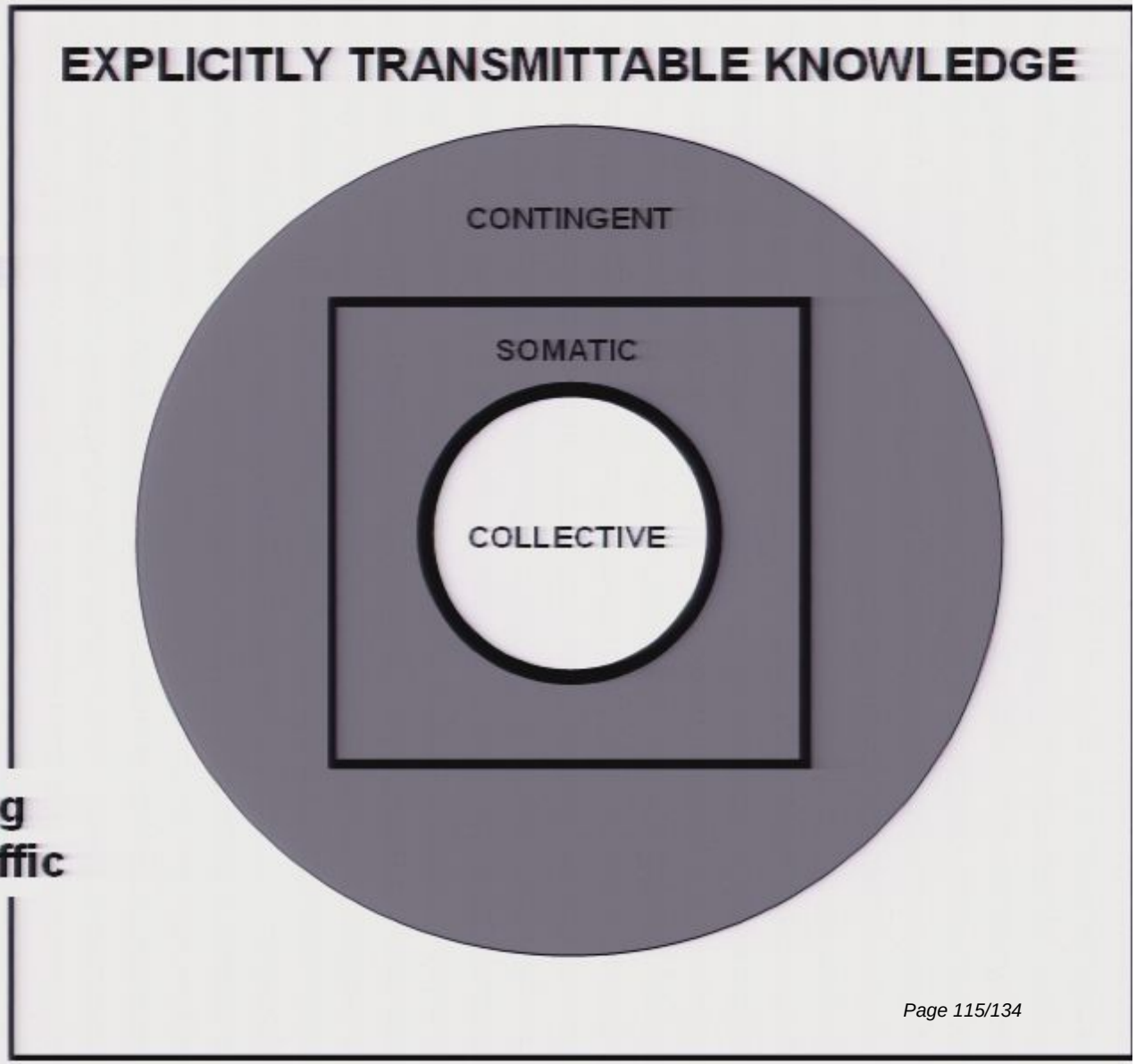
The terrain of tacit knowledge

From ms *Tacit and Explicit Knowledge*

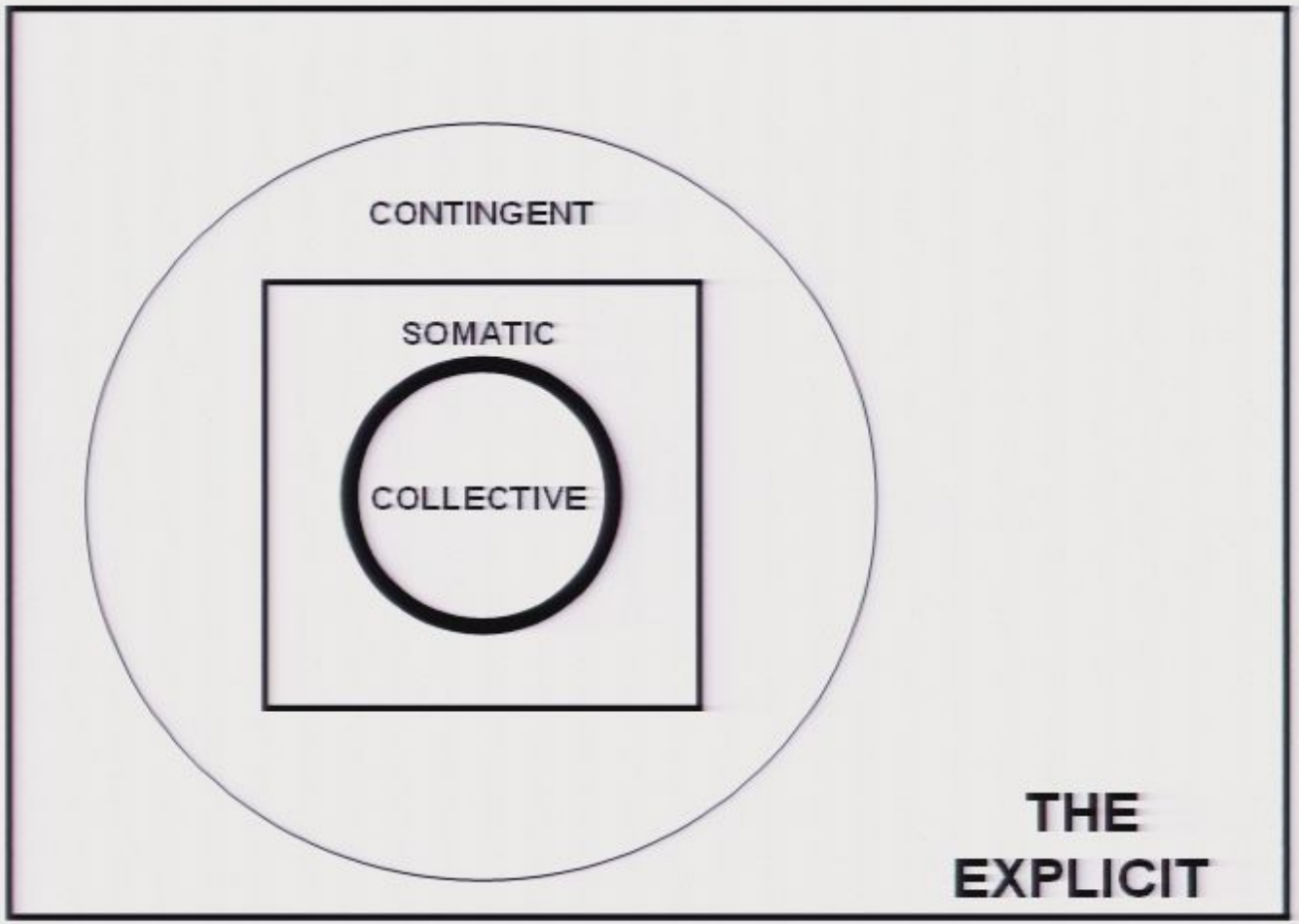
Bicycle balancing



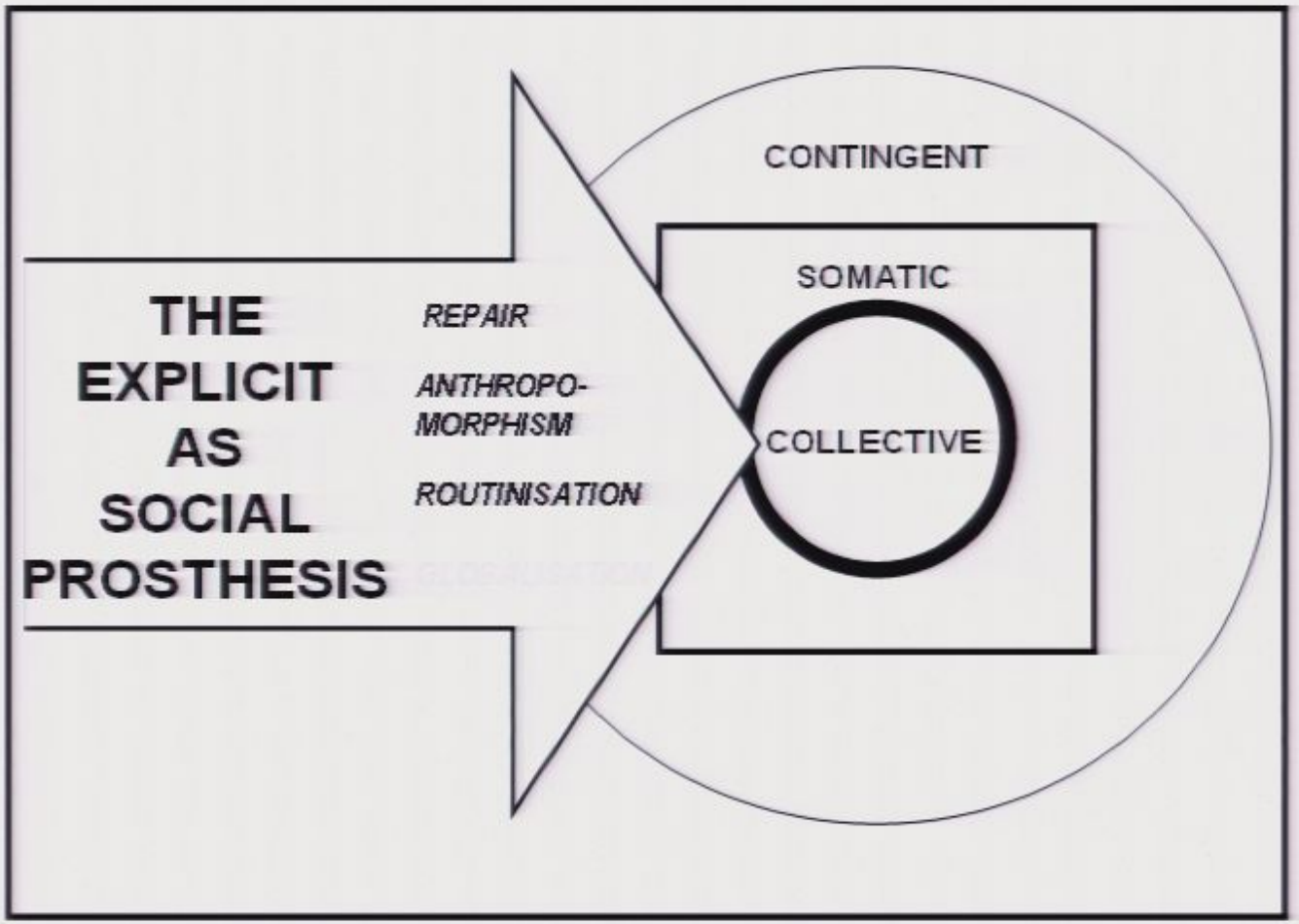
Riding in traffic



From tacit to explicit



The tacit enters collective life



PART 3

What difference does the internet make?

Bandwidth of electro-mechanical communication

Bandwidth of electro-mechanical communication

Books/letters/papers

Telephone

Email

Internet

Bandwidth of electro-mechanical communication

Books/letters/papers

Telephone

Email

Internet

Computer information storage and transfer

Bandwidth of electro-mechanical communication

Books/letters/papers

Telephone

Email

Internet

Computer information storage and transfer

Video conferencing

Bandwidth of electro-mechanical communication

Books/letters/papers

Telephone

Email

Internet

Computer information storage and transfer

Video conferencing

Virtual reality

Bandwidth of electro-mechanical communication

Books/letters/papers

Telephone

Email

Internet

Computer information storage and transfer

Video conferencing

Virtual reality

Brain in vat

Bandwidth of electro-mechanical communication

Books/letters/papers
Telephone
Email
Internet
Computer information storage and transfer
Video conferencing
Virtual reality
Brain in vat
Artificial society (The Matrix)

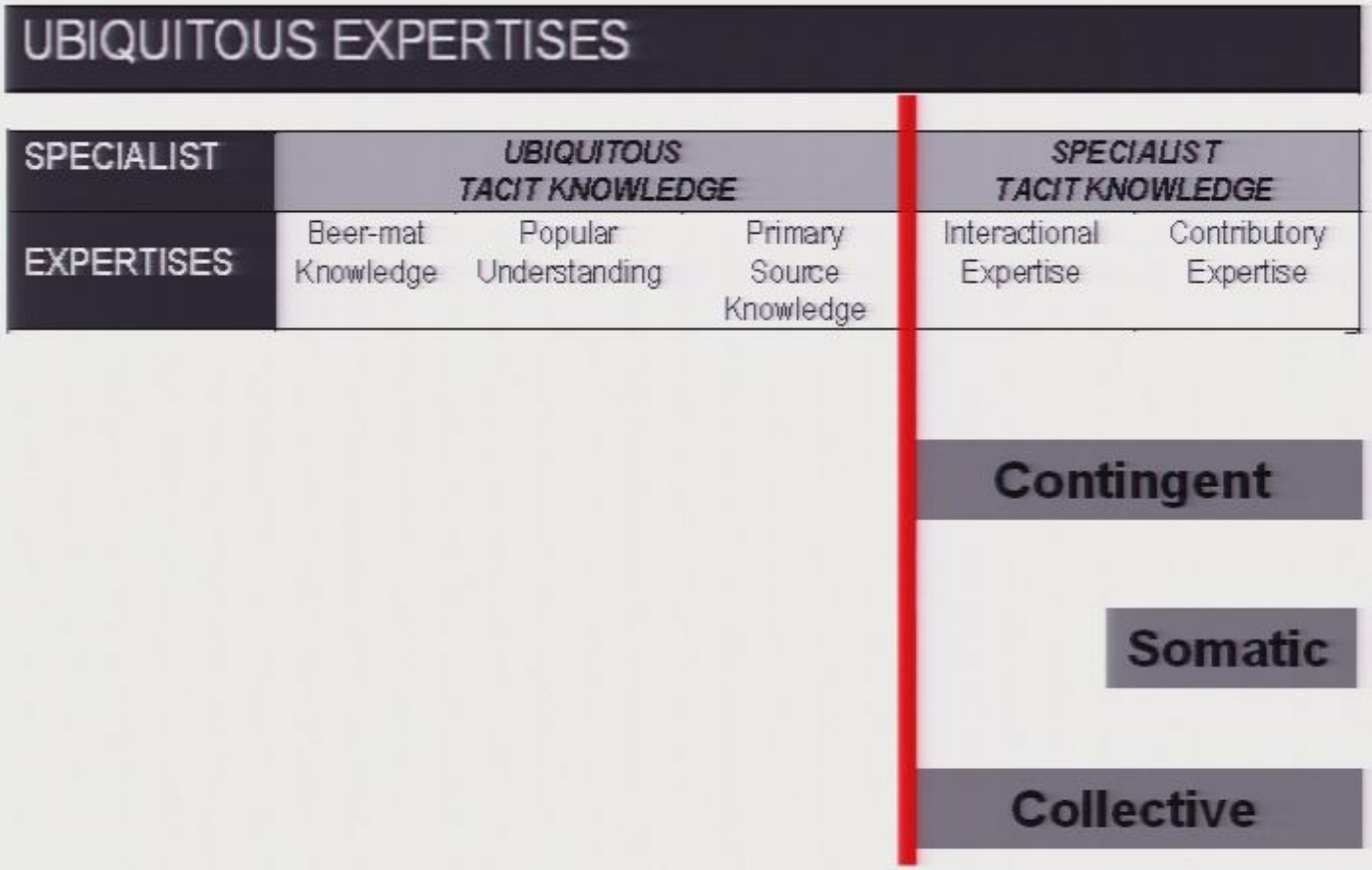
The internet, expertise and tacit knowledge

UBIQUITOUS EXPERTISES					
SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

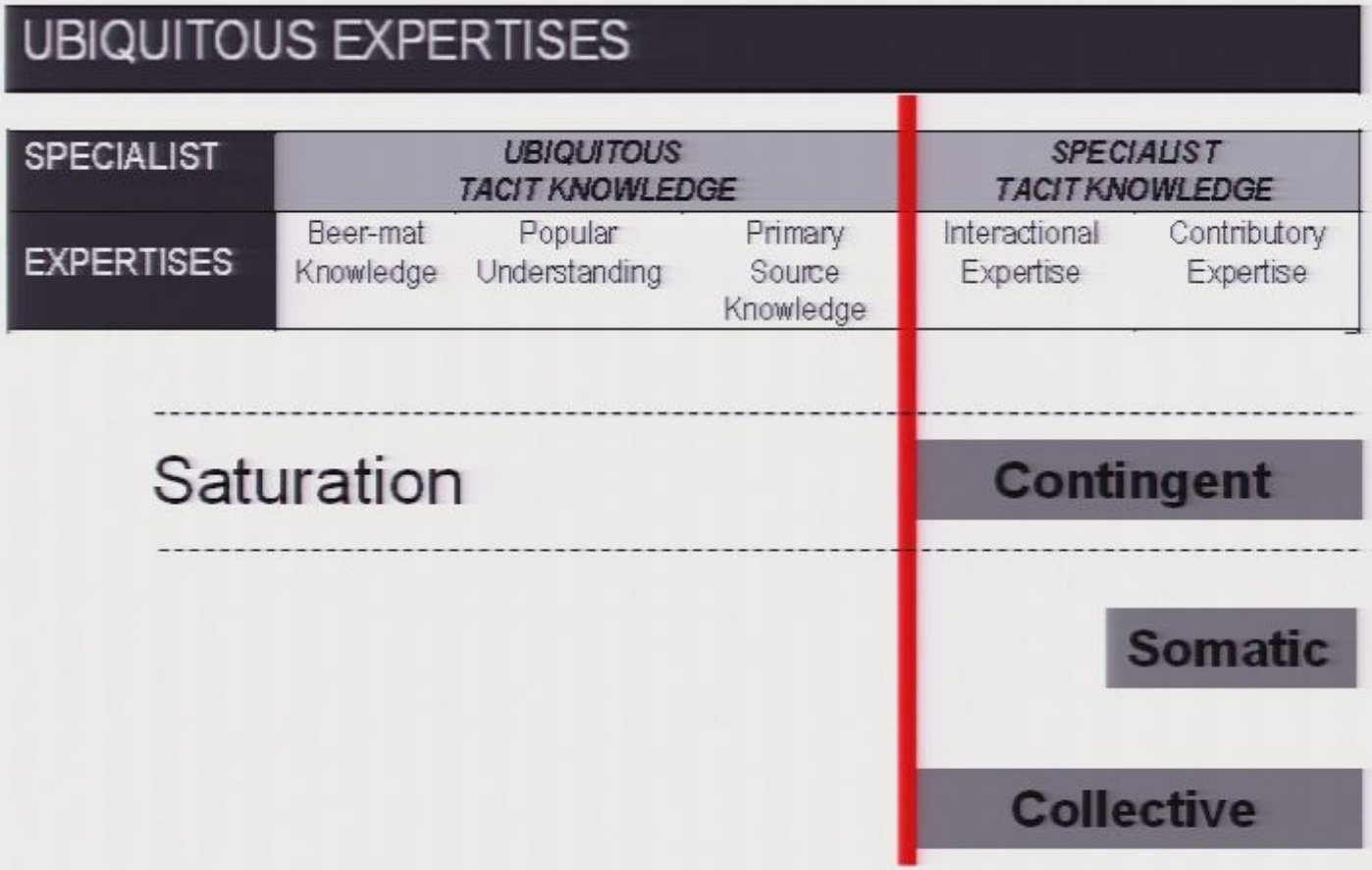
The internet, expertise and tacit knowledge

UBIQUITOUS EXPERTISES					
SPECIALIST	*UBIQUITOUS TACIT KNOWLEDGE*			*SPECIALIST TACIT KNOWLEDGE*	
EXPERTISES	Beer-mat Knowledge	Popular Understanding	Primary Source Knowledge	Interactional Expertise	Contributory Expertise

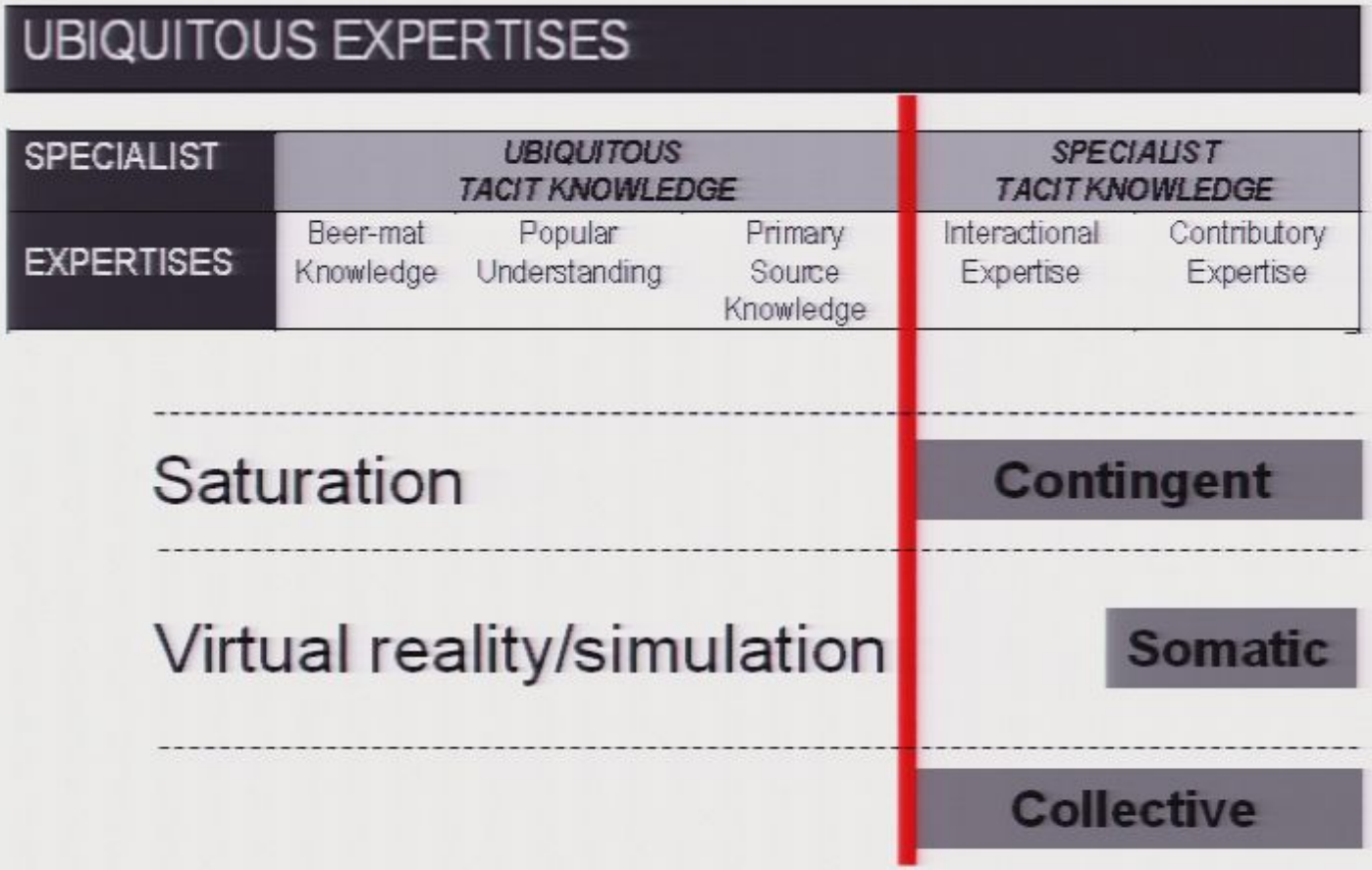
The internet, expertise and tacit knowledge



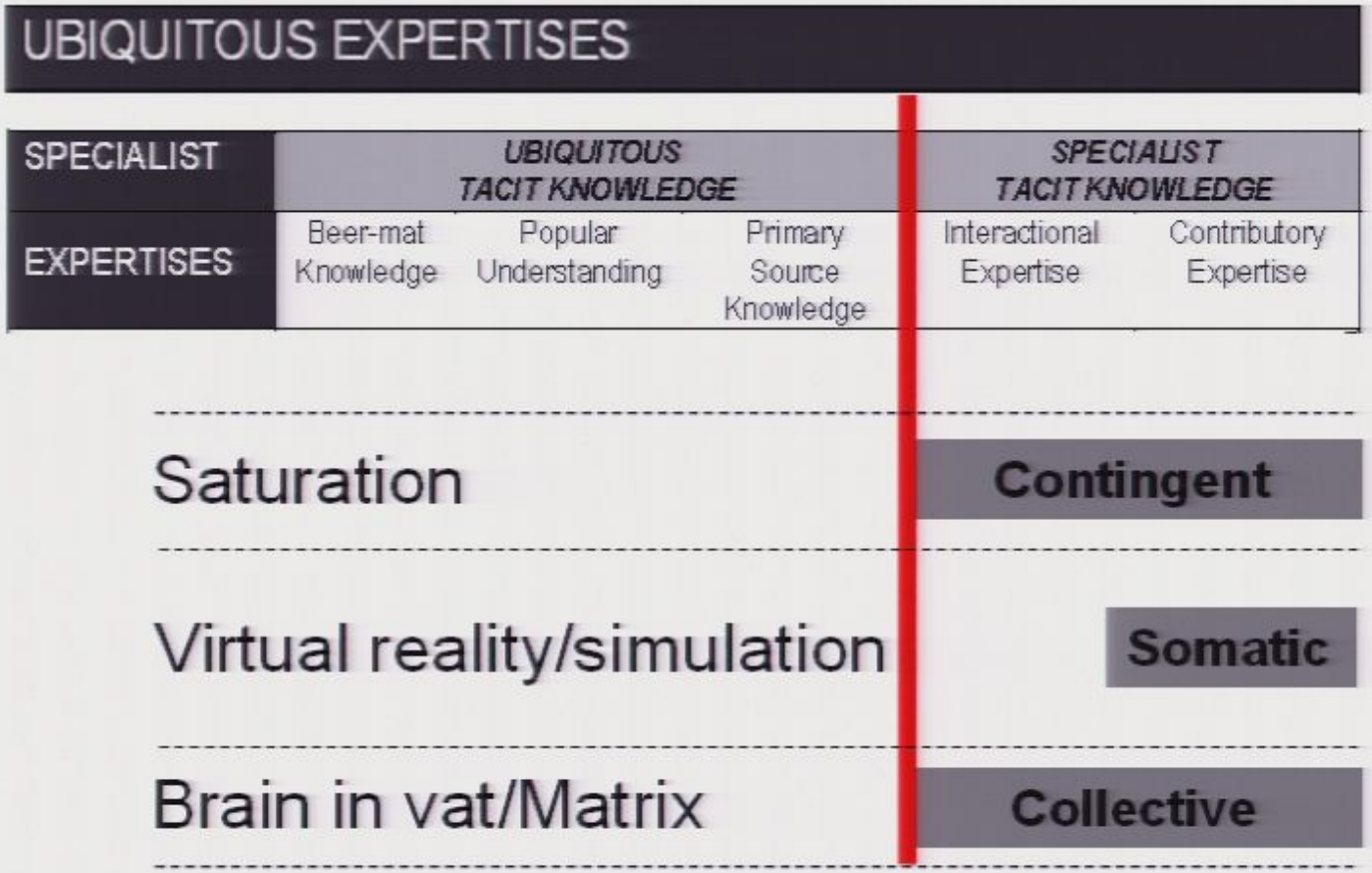
The internet, expertise and tacit knowledge



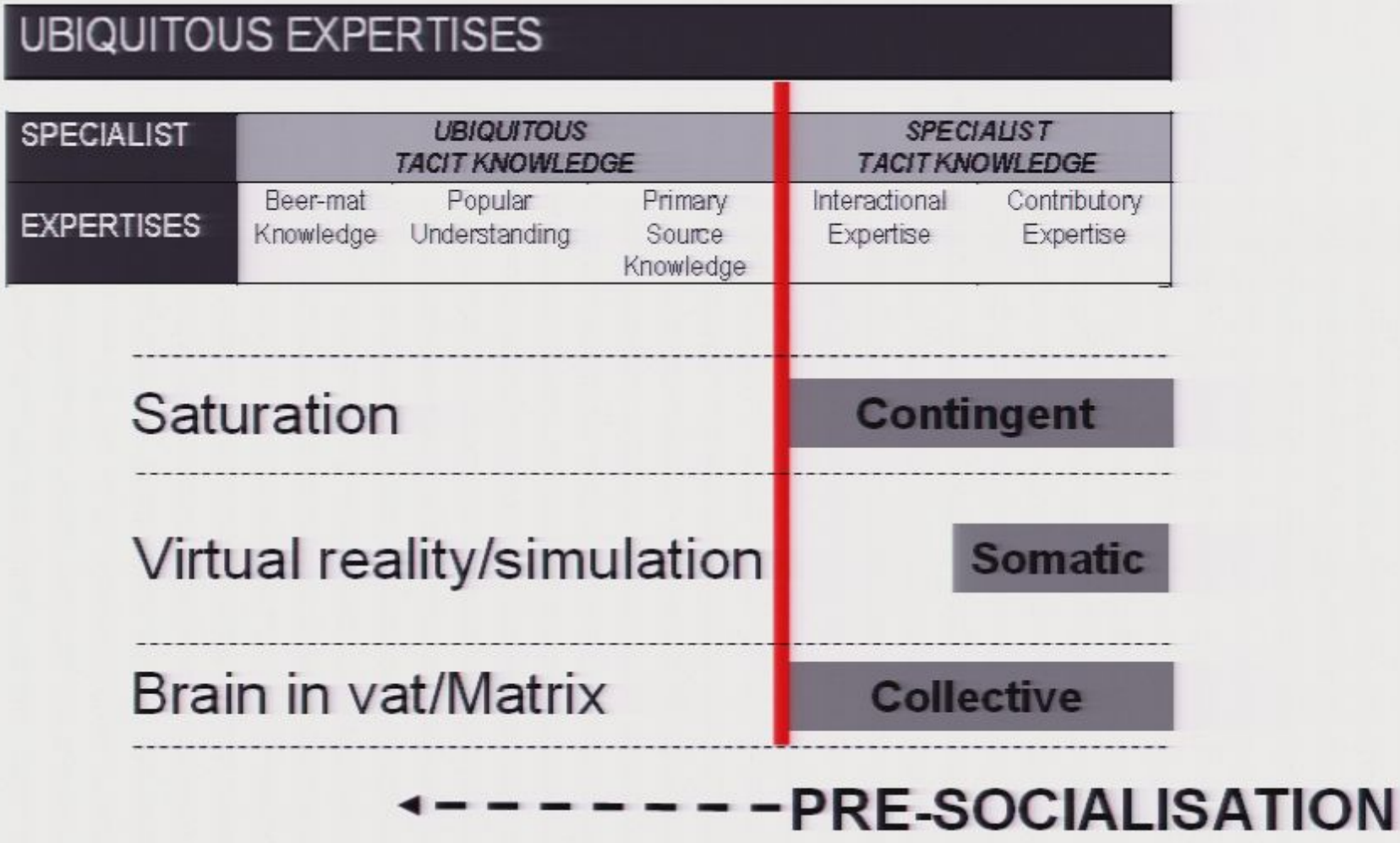
The internet, expertise and tacit knowledge



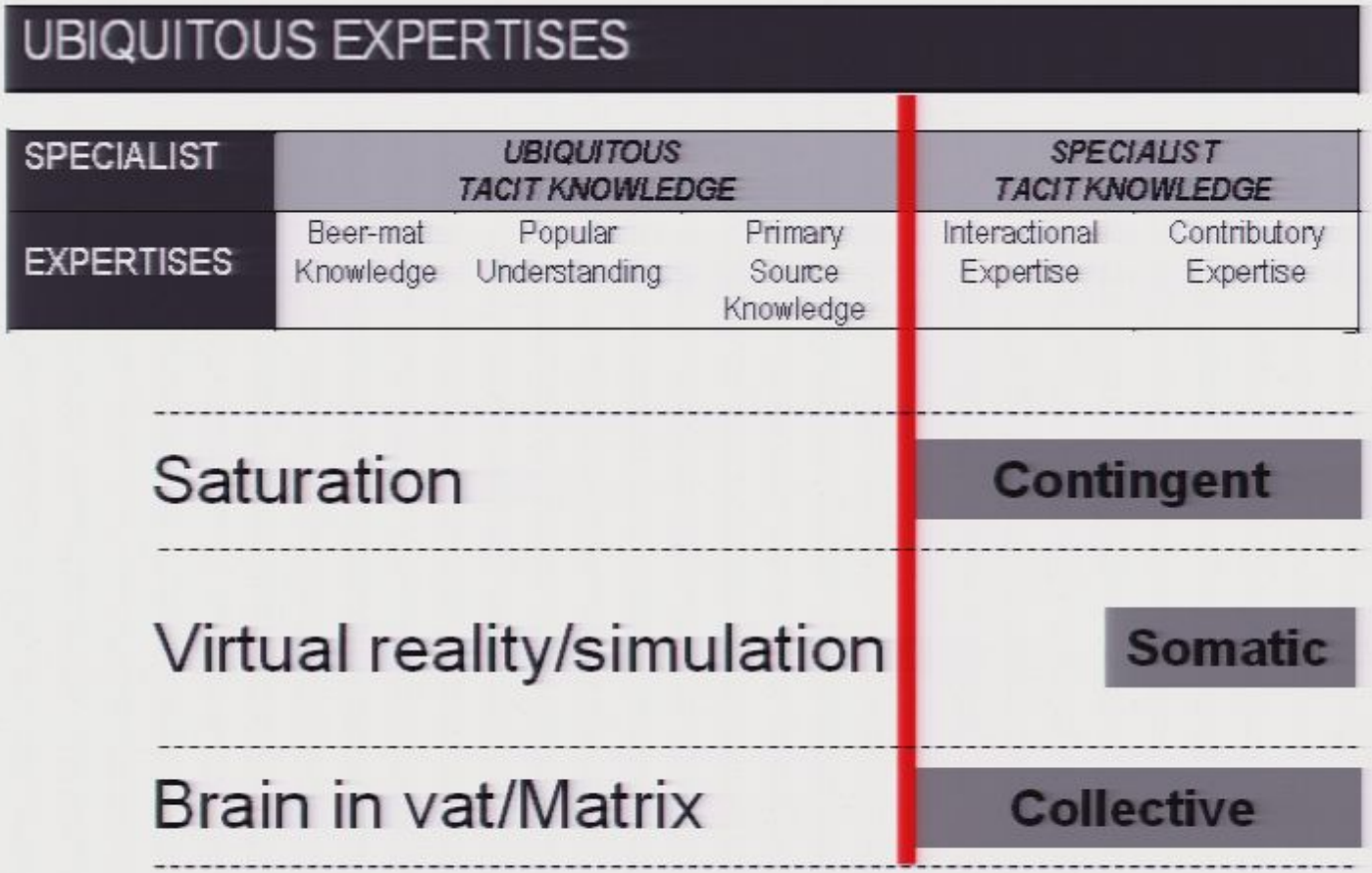
The internet, expertise and tacit knowledge



The internet, expertise and tacit knowledge



The internet, expertise and tacit knowledge



PRE-SOCIALISATION

Mikulski, Sarfatti, Mbeki

Finding more on the PTE and more

www.cf.ac.uk/socsi/expertise

Or Google `Harry Collins Expertise' and look for All@SEE

Harry Collins and Robert Evans

Rethinking Expertise

University of Chicago Press

2007

Case Studies of Expertise and Experience

Studies in History and Philosophy of Science

December 2007