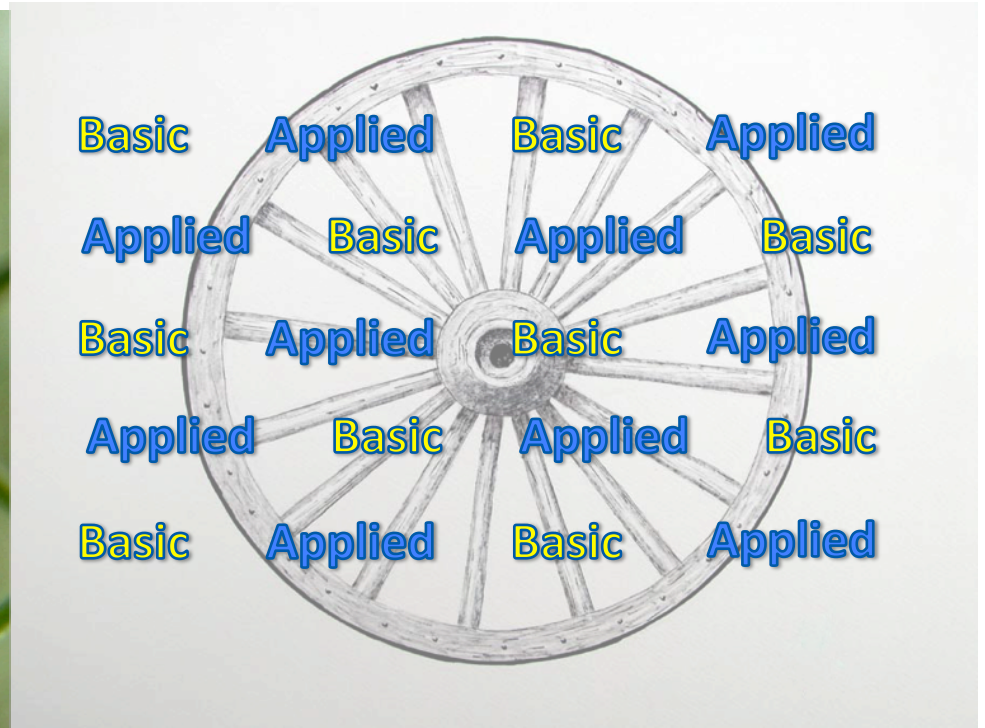




Notes from a Basically Applied Scientist

24 Jan 2012

Sanford Eigenbrode
Professor of Entomology





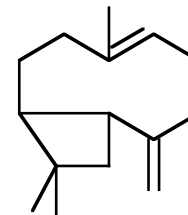
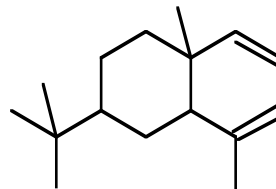
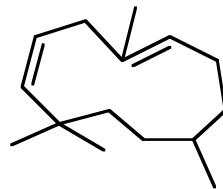
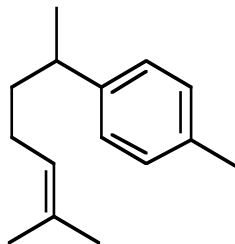
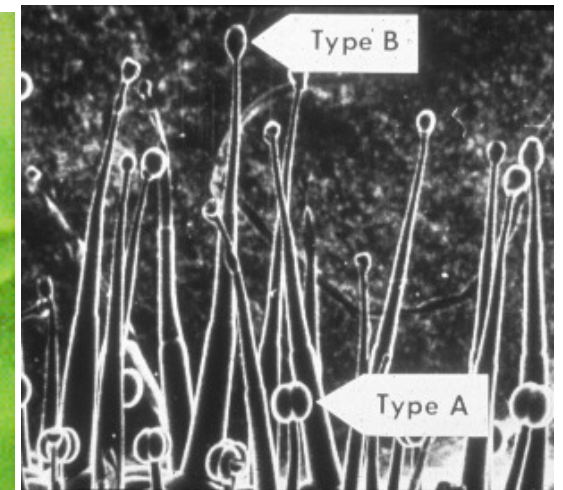


Host Plant Resistance to Insect Pests

Glandular trichomes on wild tomato spp.

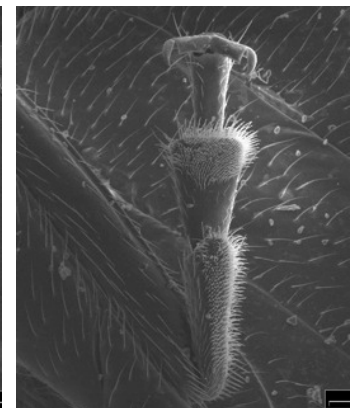
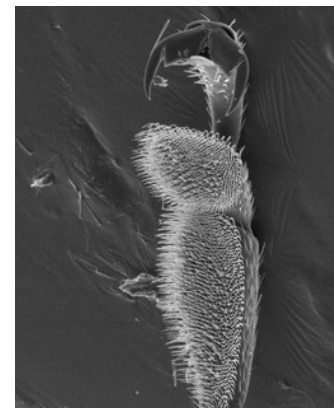
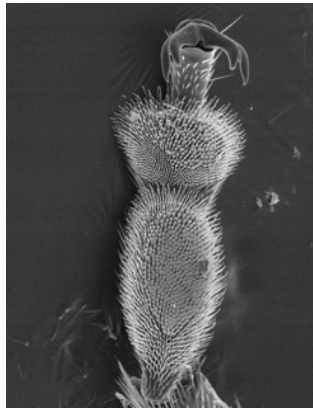
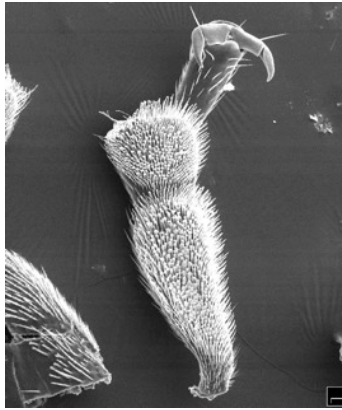
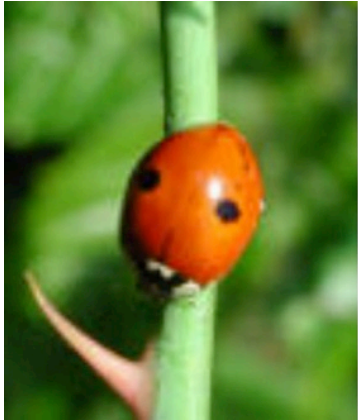


D. Beet armyworm.



A close-up photograph of a plant with green, pinnate leaves. The leaves are arranged in two main branches, each with several pairs of rounded leaflets. The background is dark and out of focus. The title text is overlaid in the upper right corner.

Biological Control and Host Plant Breeding



A. bipunct.

H. axyr.

C. sept.

C. trans.

H. conv

Plant Phenotype and the Insect Community



*Geocoris
pallens*



*Nabis
alternatus*



*Hippodamia
convergens*



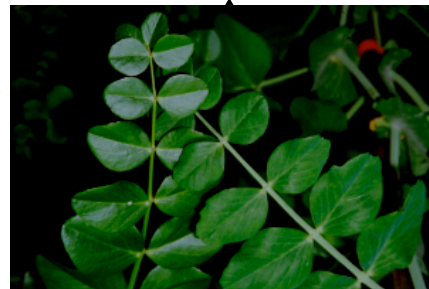
*Coccinella
septempunctata*



Aphidius ervi



Acyrtosiphon pisum



Pisum sativum

Northfield, Eigenbrode, Snyder
2012 (Ecology)

Plant Virus Infection and Vector Behavior

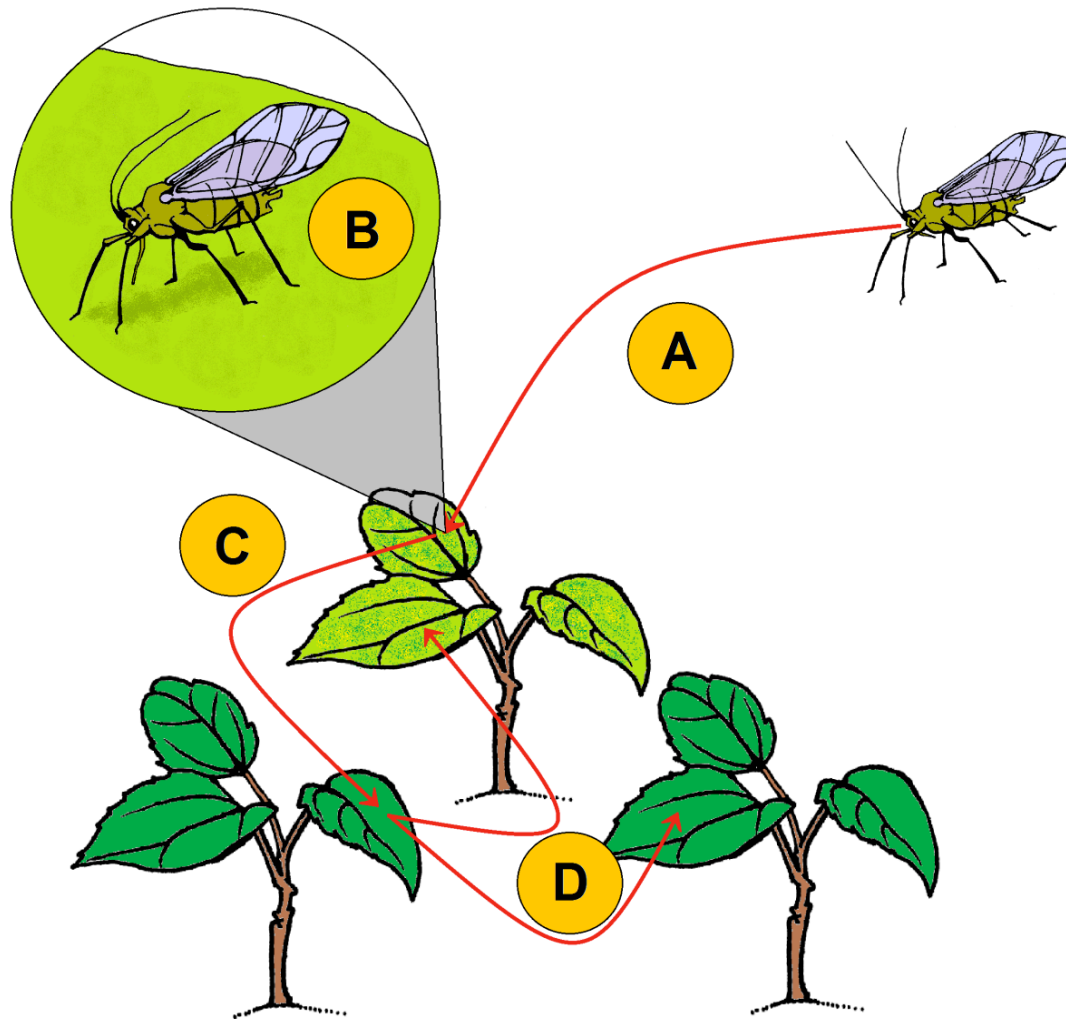


Illustration: Kerry Mauck





Sanford Eigenbrode

Basic and Applied

- Basic science (fundamental, pure) - motivated by curiosity
- Applied science - designed to answer specific questions (solve problems)

Basic and Applied

Socrates: *Shall we set down astronomy among the subjects of study?*

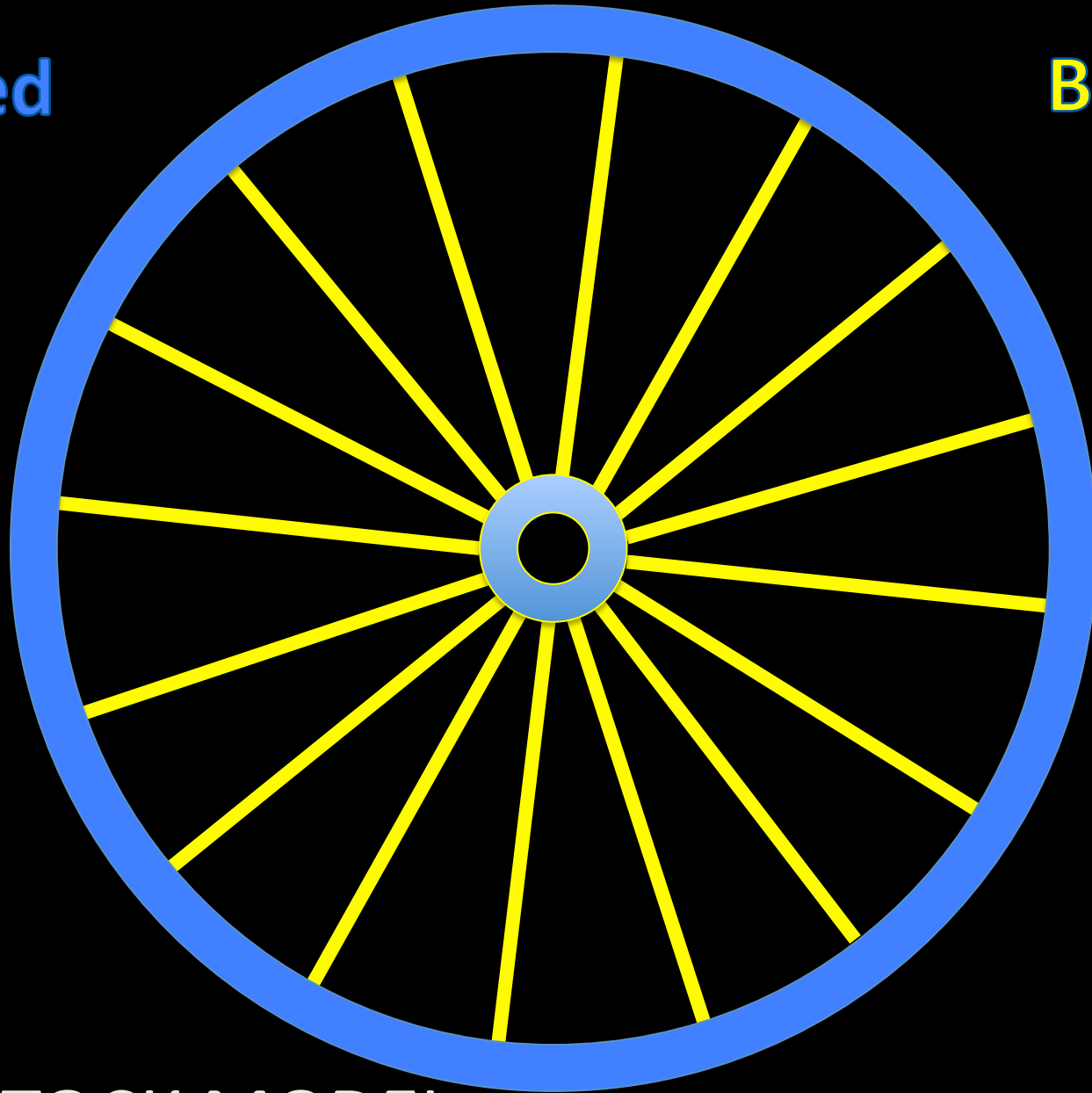
Glaucon: *I think so, to know something about the seasons, the months and the years is of use for military purposes, as well as for agriculture and for navigation.*

Socrates: *It amuses me to see how afraid you are, lest the people should accuse you of recommending useless studies.*

— Plato's Republic

Applied

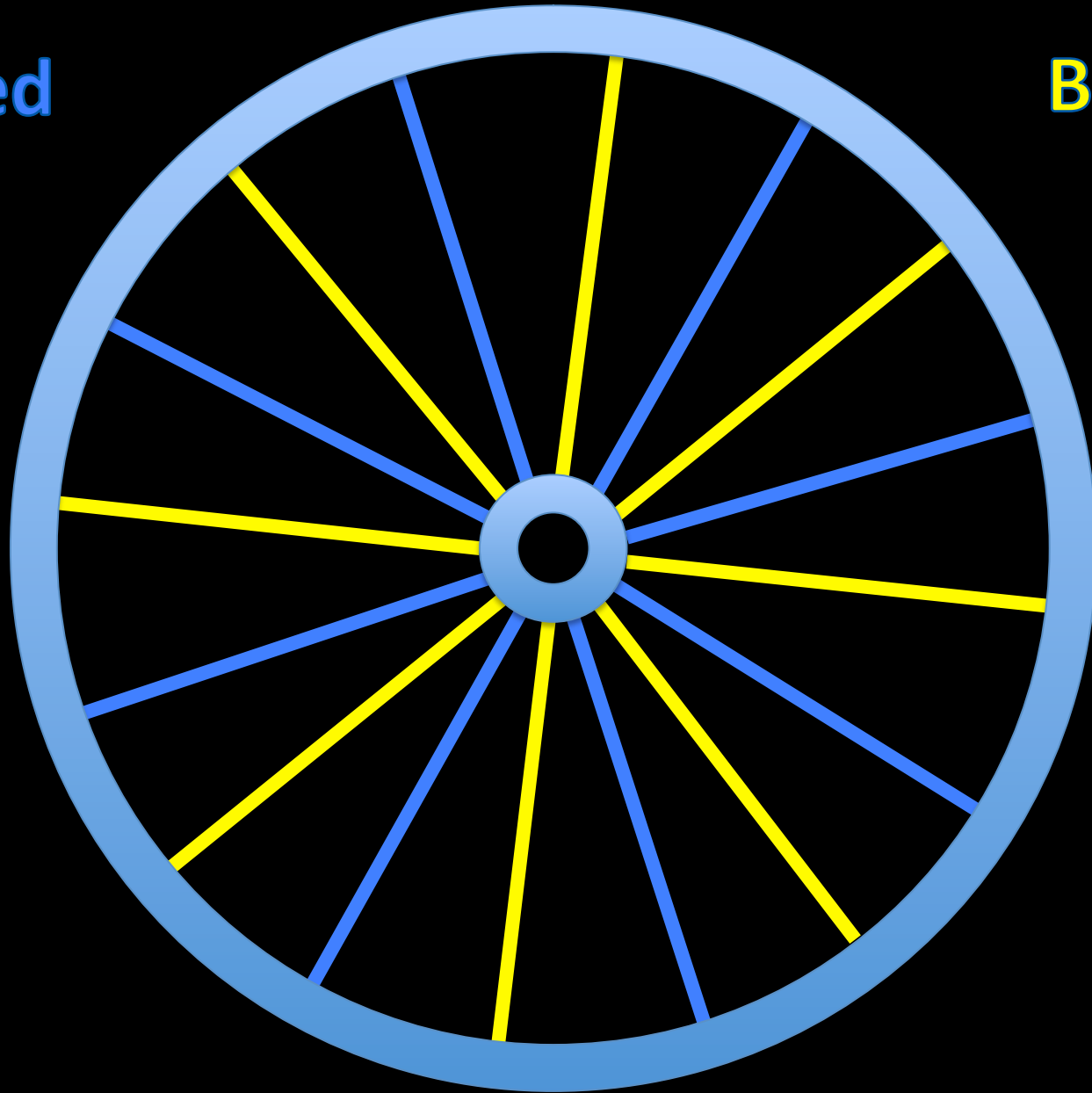
Basic

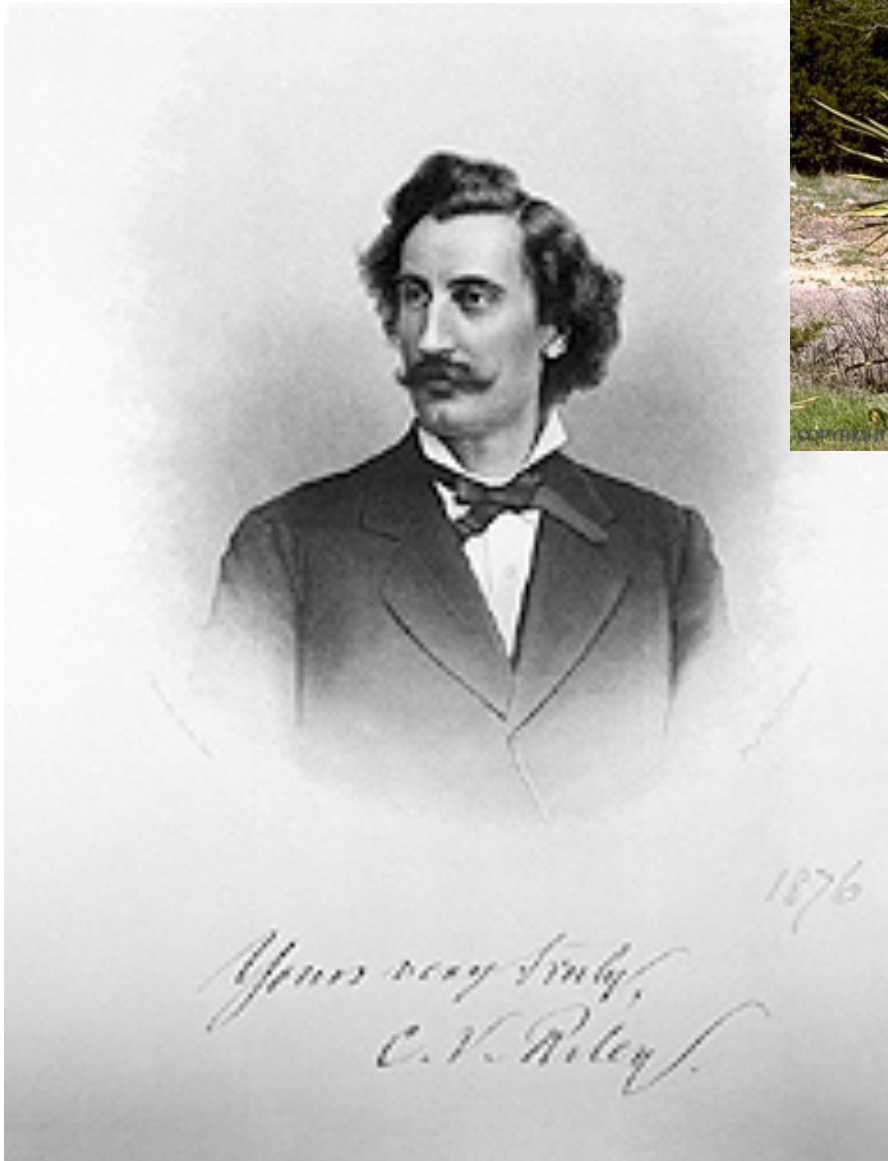


FEEDSTOCK MODEL

Applied

Basic

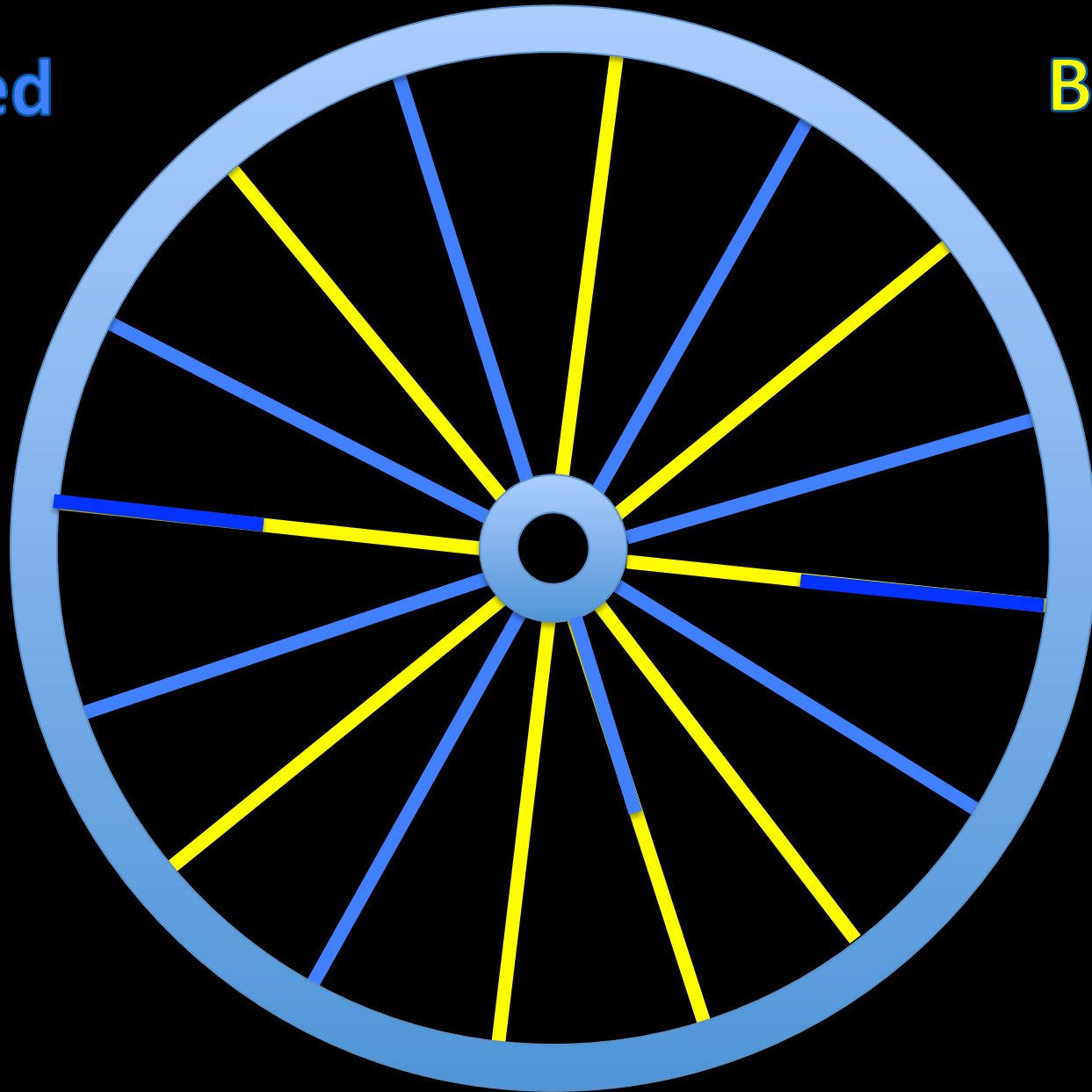




UC Statewide IPM Project
© 2000 Regents, University of California

Applied

Basic

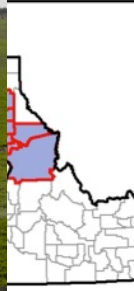


Collaboration and Integration



UI NSF-IGERT
Projects



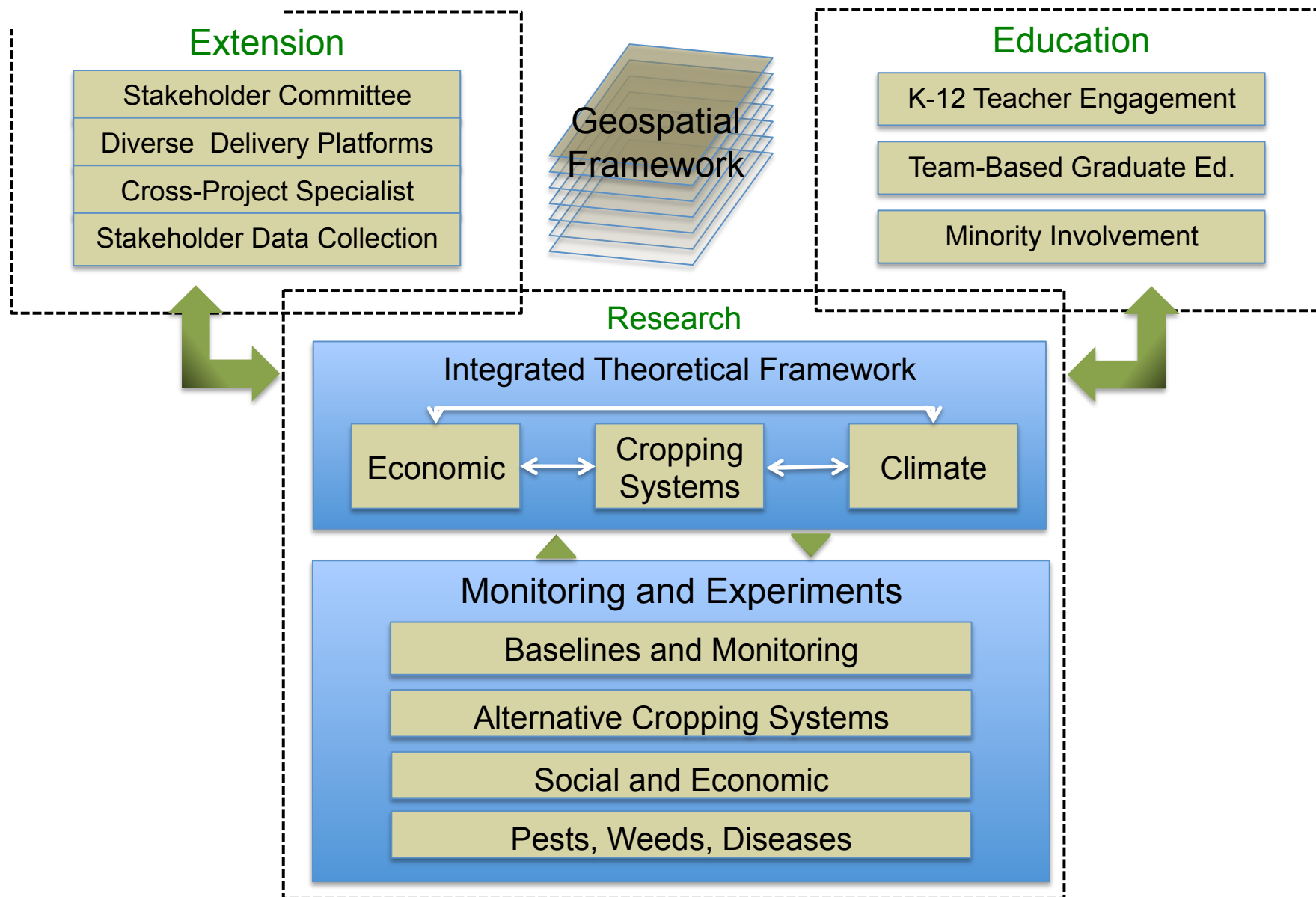


Old
ool
Transition

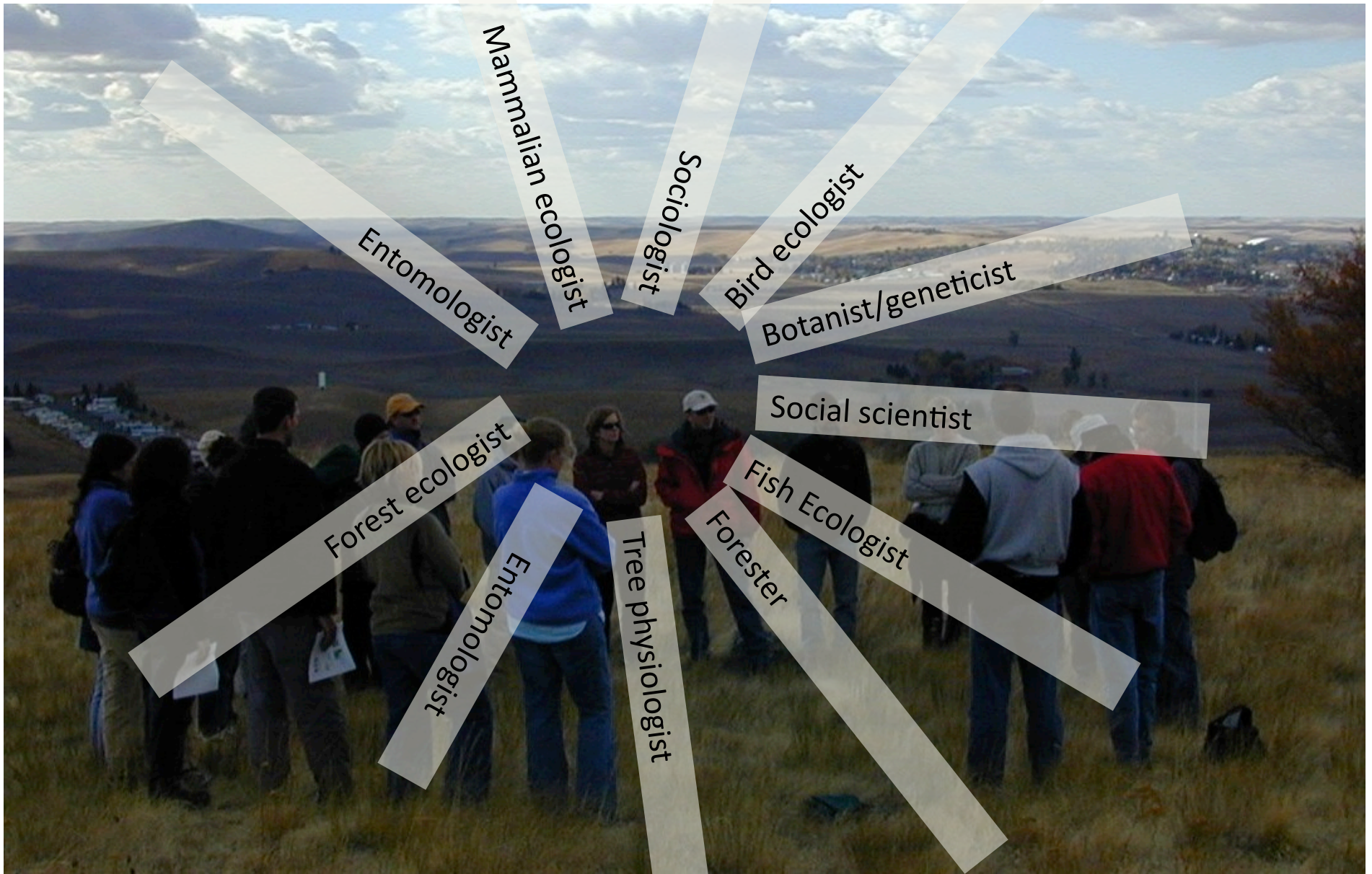


New Zone: Warmer Wetter

Project Integration



UI IGERT project 2001-2008, 2009-2015



Calls for Interdisciplinary Work

The need to solve societal problems

The inherent complexity of nature and society

The power of new technologies

The desire to explore new synthesis

— *Facilitating Interdisciplinary Research*, NAS, p. 40



The Toolbox Workshop



Epistemology

I. Motivation

Core Question: Does the principal value of research stem from its applicability for solving problems?

1. The principal value of research stems from the potential application of the knowledge gained.

Disagree

Agree

1

2

3

4

5

I don't know

N/A

2. Cross-disciplinary research is better suited to addressing applied questions than basic questions.

Disagree

Agree

1

2

3

4

5

I don't know

N/A

3. My disciplinary research primarily addresses basic questions.

Disagree

Agree

1

2

3

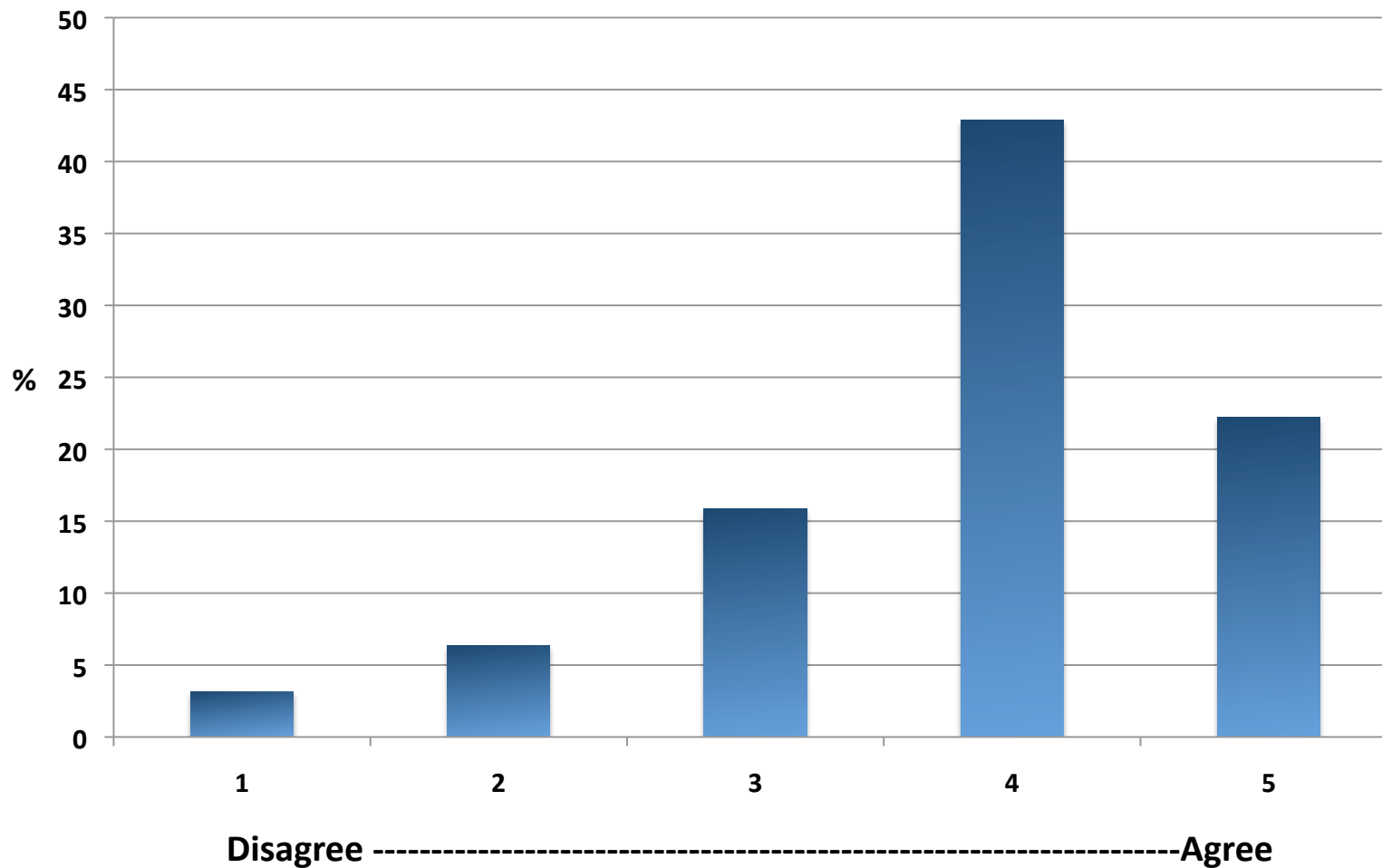
4

5

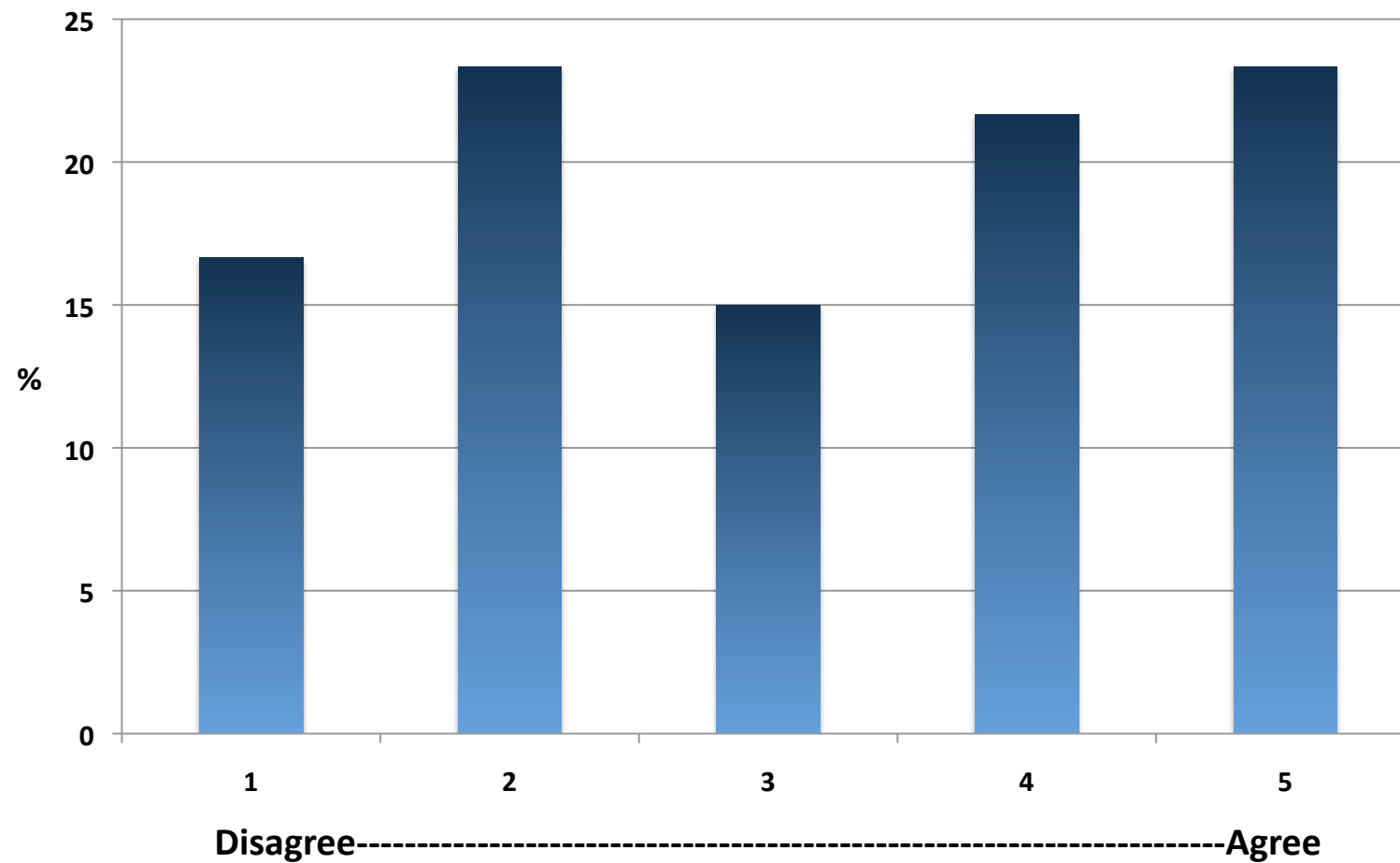
I don't know

N/A

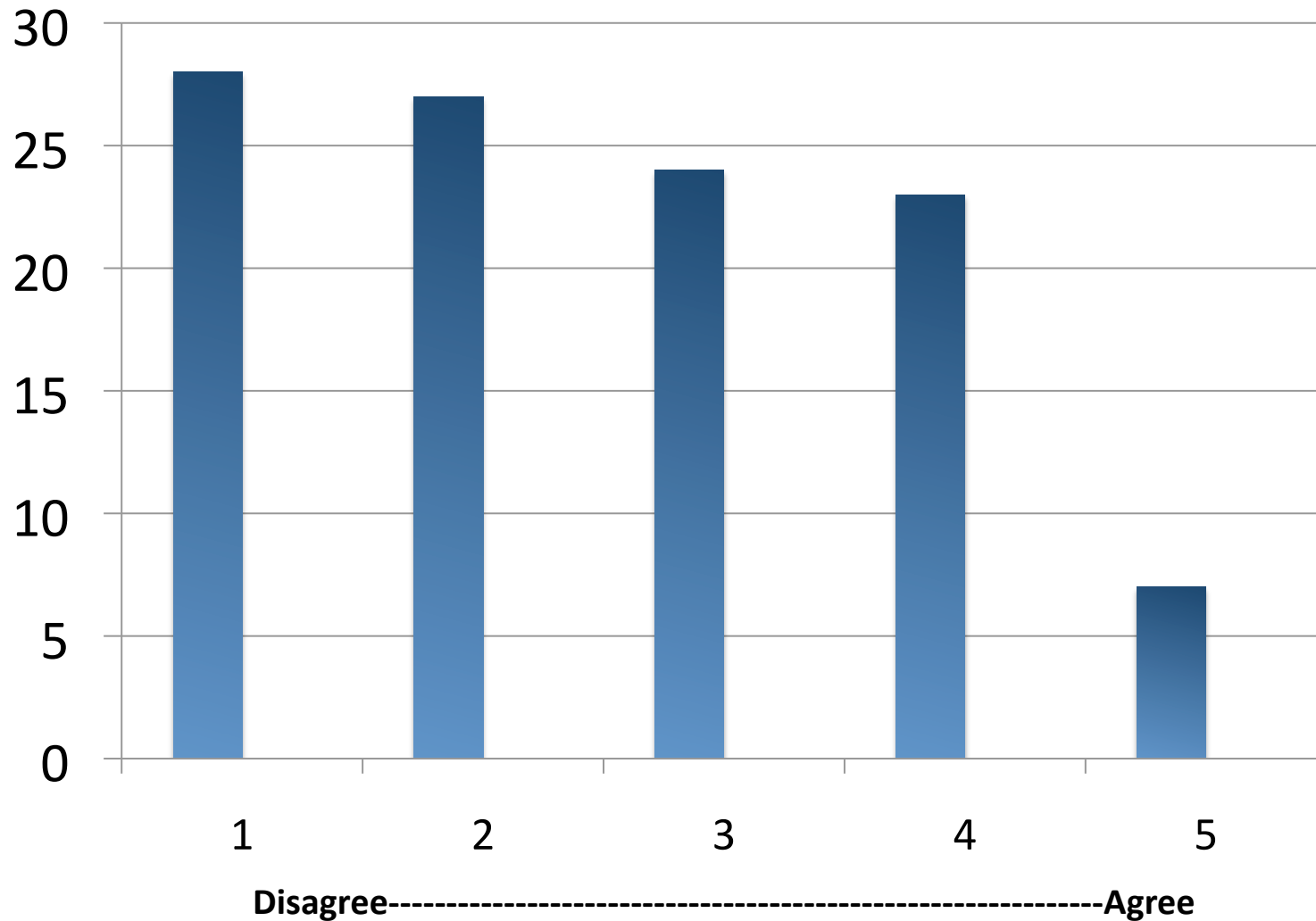
The principal value of science is its application (n = 60; mean = 3.75)



My research addresses basic questions (n = 60; mean = 3.12)



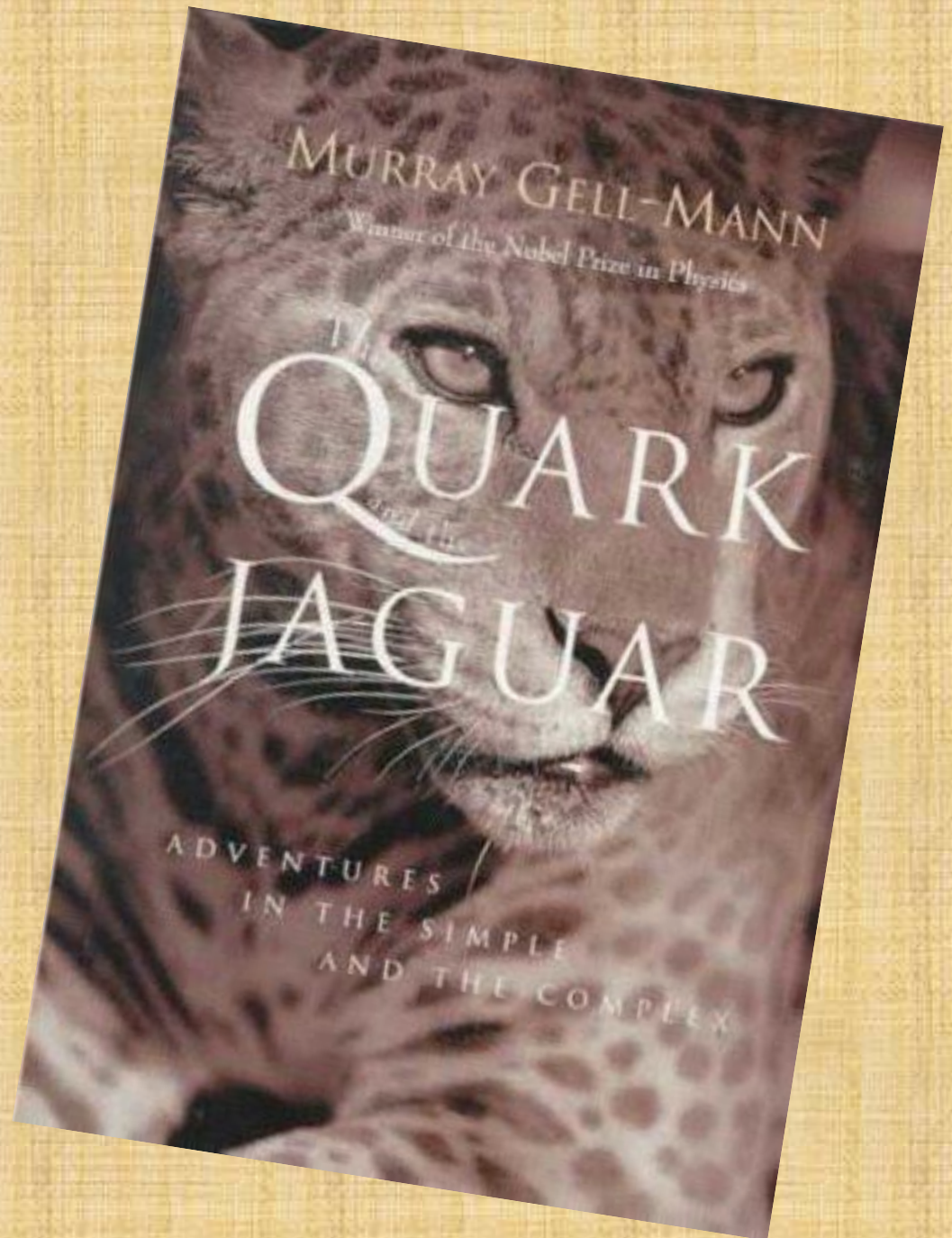
Cross-disciplinary work is better suited to addressing applied questions (n = 120)



“...the network of relationships linking the human race to itself and to the rest of the biosphere is so complex that all aspects affect all others to an extraordinary degree.

...no gluing together of partial studies of a complex nonlinear system can give a good idea of the behavior of the whole.”

“The world of the quark has everything to do with a jaguar circling in the night.”



The Potential for Broader Integration

“Skepticism and wonder [are the]...the two uneasily cohabiting modes of thought that are central to the scientific method” –Carl Sagan

“Science is as much an inner path ... as it is a discipline aimed at accumulating knowledge of the physical world.” - J. W. von Goethe

Anschauung – wonder through looking



Phaedole humida

0.5mm

JTLC000001497. Costa Rica. Image by J. Longino Dec'02.

The Potential for Broader and Deeper Integration?

Are we at a stage where “we know very much, but understand very little”? (Manfred Max Neef 2005)

And can we address that through broader, more innovative collaborations?

The Potential for Broader and Deeper Integration?

Closer collaborations between sciences, humanities and the arts

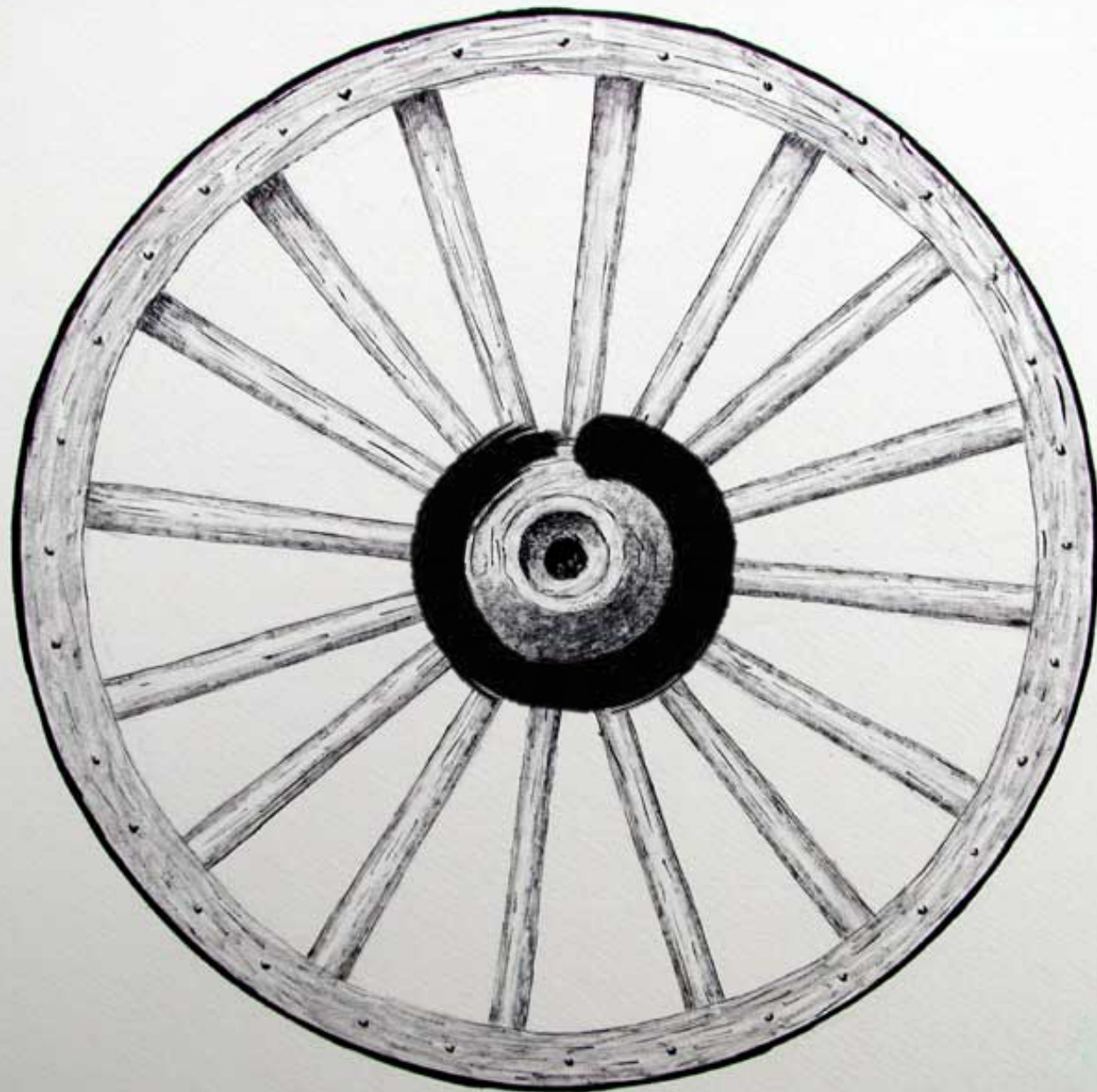


The Potential for Broader and Deeper Integration?

Nontraditional Formats Permitted and Used in Dissertations in English and Other Language Departments

Format	Policy Permitting Its Use	Format Approved in Last 5 Years
Digital project	10.4%	3.4%
Creative nonfiction	8.8%	6.8%
Suite of essays	8.8%	5.7%
Fiction or poetry	7.7%	6.8%
Translation	7.7%	3.4%
Public scholarship	4.4%	3.4%
Portfolio	2.2%	2.3%
Collaborative work	1.1%	0.6%

Read more: <http://www.insidehighered.com/news/2012/01/09/mla-considers-radical-changes-dissertation#ixzz1jeGjmsr0>
Inside Higher Ed, Jan. 2012



“All the spokes are needed.”