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Major League

Studying How Students Move Through Majors and What Difference It Makes

- Bob Cox, Ruan Hoe, Kelly Wahl & Caroline West
  - UCLA Office of Analysis and Information Management
    - CAIR 2006 - Pasadena

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Major League Origins

- Academic leadership at UCLA has questions and concerns about:

  - The uneven distribution of undergraduates across College major programs

  - The effects of high/low numbers on the quality of the student academic experience

  - The heavy teaching and advising workload for faculty and staff in certain departments

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Policy Concept and Action Options

- To balance out uneven workload, change the distribution of undergraduates by major program:

  - Restrict access to popular majors

  - Encourage early major choice; discourage major change

  - Attract students to less popular majors
  - Retain students in less popular majors

  - Admit transfers to less popular majors
  - Admit freshman from high school to less popular majors

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Focus on Freshman and 'Major Mobility'

- To size up prospects for setting freshman admit targets by major program area, we studied:

  - The situation at peer institutions

  - Applicants, admits, and enrolled freshmen by intended major program area

  - Historical patterns of major program participation and mobility

  - Student outcomes according to patterns of major mobility

  - UCUES survey responses from major-changers about the reasons for major change

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First Base
Rates and Measures

- What majors do entering freshmen intend to pursue?

- How often do they:
  - Persist in the intended major
  - Change major
  - Add a second major?

- Does mobility vary by major program area?

- What fraction of career course workload is concentrated in the major department?

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Second Base
Does a Change Make a Difference?

- Do entering freshmen with intended majors differ from 'undeclared' freshmen on measures of:
  - Time-to-degree
  - Total career workload (units earned)?

- How many times do students change majors on average?

- Does changing/persisting make a difference in outcomes?

- Does the timing of change make a difference?

- Does participating in a double major make a difference?

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Third Base
Why Do Students Change Majors?

• What reasons for changing majors are most often cited by survey-responding, major-changing students?

• Are there underlying patterns of response to questions about major change?

• How are reasons for major change linked to characteristics of major-changing students?

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Home Plate
Rounding the Bases

• Putting it all together

• What we have learned

• What we have done with it
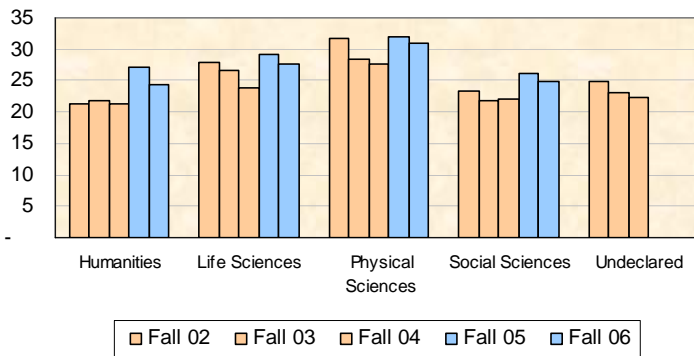
• What difference it has made so far

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First Base
Rates and Measures

- Admissions by Major – Issues and Options
  - Prospects of retaining students in majors they applied to as high school seniors
  - Freshmen / Transfer Applicants
  - Professional School / College Applicants
  - Targeting by Major / Broader Area
  - Positive and negative aspects of major change

- Intended Majors Great & Small

- Measures of Major Mobility

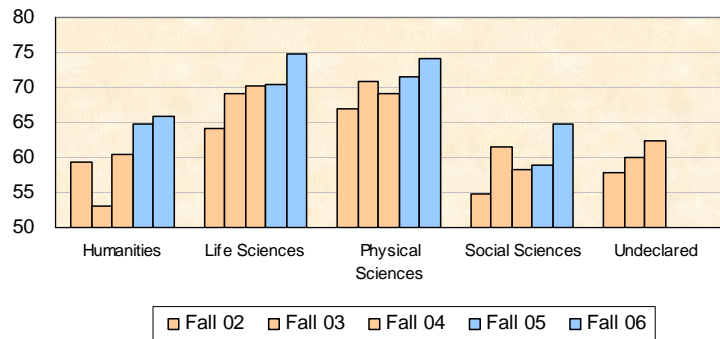- Major Programs and Workload in Corresponding Disciplines
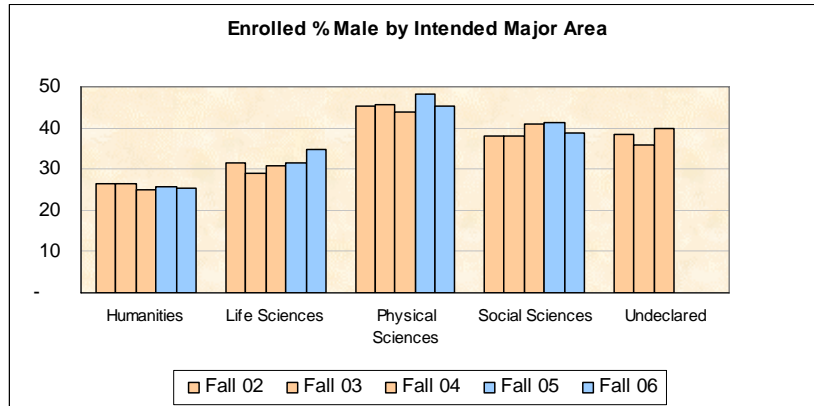

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Major Intentions

- Applicant profiles by intended major area

- New campus policy on 'undeclared' status

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% of Freshman Applicants Admitted by Intended Major Area

Fall 02 | Fall 03 | Fall 04 | Fall 05 | Fall 06

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Enrolled % Capped HS GPA > 4.0 by Intended Major Area

Fall 02 | Fall 03 | Fall 04 | Fall 05 | Fall 06

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Enrolled % Male by Intended Major Area

	Humanities	Life Sciences	Physical Sciences	Social Sciences	Undeclared

Legend: Fall 02, Fall 03, Fall 04, Fall 05, Fall 06

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Major Intentions

- New freshmen in twelve cohorts by:
  - Intended major area
  - Top 14 specified majors
  - N= 47,315

- Balance and concentration

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First Fall Quarter Intended Majors
12 UCLA Freshman Cohorts
Fall 1991 - Fall 2002

Major Area	Number	%
Humanities	2,019	*4*
Life Sciences	8,768	*19*
Physical Sciences	3,406	*7*
Social Sciences	6,724	*14*
Undeclared	18,402	*39*
College Total	39,319	*83*
Professional Schools	7,996	*17*
UCLA Total	47,315	*100*

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First Fall Quarter Intended Majors
12 UCLA College Freshman Cohorts
Fall 1991 - Fall 2002

Major Department	Number	%	Cum %
Biology	5,191	*25*	*25*
Economics	3,671	*18*	*42*
Chemistry	2,054	*10*	*52*
Psychology	1,803	*9*	*61*
Political Science	1,757	*8*	*69*
English	1,149	*5*	*75*
Mathematics	833	*4*	***79***
Microbiology	599	*3*	*82*
Physiological Sci	550	*3*	*84*
History	512	*2*	*87*
Physics	390	*2*	*88*
Molecular Biology	375	*2*	*90*
Sociology	296	*1*	*92*
Neuroscience	204	*1*	***93***
34 Others	1,533	*7*	*100*
All College Declared	20,917	*100*	

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Measuring Major Mobility

- Analysis on a twelve-cohort basis - 1991-2002
- Focus on freshmen entering the College with a definite intended major / N = 20,917
- Measure mobility repeatedly, cohort by cohort
- Check back on major program status when students arrive at the normative senior year (4th fall quarter)
- Over 90% of all major mobility has already occurred
- Study 'major programs generated' to see combined effects of attrition, major mobility, double majoring

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First Fall Intended Majors & Fourth Fall Major Programs
12 UCLA Freshman Cohorts
Fall 1991 - Fall 2002

Major Area	1st Fall	4th Fall	% 1st	% 4th
Humanities	2,019	4,433	4	10
Life Sciences	8,768	12,467	19	27
Physical Sciences	3,406	3,366	7	7
Social Sciences	6,724	16,465	14	36
Undeclared	18,402	2,017	39	4
College Total	39,319	38,748	83	85
Professional Schools	7,996	7,011	17	15
UCLA Total	47,315	45,759	100	100

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Findings on Major Mobility

- There are robust, repeated patterns across 12 Cohorts

- 100 freshmen entering UCLA College with a given intended major will generate, on average, at the 4th fall quarter, 98 active major programs:

  - 47 active programs in the intended major
  - 51 active programs in other majors

  - 66 active programs in the same broad major area
  - 32 active programs in other broad major areas

- Persistence is strongest in the social sciences, weakest in the physical sciences

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**Major Programs Generated at the Fourth Fall Quarter per 100 Freshmen Entering with Intended (Declared) Majors
by UCLA College Disciplinary Area in 12 Cohorts from Fall 1991 to Fall 2002**

Intended Area	Entering Freshmen	4th Fall Majors	Multi Majors	Not Retained	Same Major	by Disciplinary Area			
						HUM	LIFE	PHYS	SOC
HUMANITIES	2,019	98	6	8	49	58	9	1	27
LIFE SCIENCES	8,768	97	3	6	40	5	69	3	17
PHYSICAL SCIENCES	3,406	95	3	8	44	4	23	48	15
SOCIAL SCIENCES	6,724	102	8	6	56	7	8	2	83
COLLEGE DECLARED	20,917	98	5	7	47	11	36	10	39

**Major Programs Generated at the Fourth Fall Quarter per 100 Freshmen Entering with Intended (Declared) Majors
by UCLA College   Department   in 12 Cohorts from Fall 1991 to Fall 2002**

| Intended Major	Entering Freshmen	4th Fall Majors	Multi Majors	Not Retained	Same Program	by Disciplinary Area			
						HUM	LIFE	PHYS	SOC
English	1,149	100	8	8	61	67	6	1	23
Biology	5,191	95	2	7	32	5	69	3	16
Psychology	1,803	98	6	8	60	7	65	1	24
Microbiology	599	100	5	5	50	5	75	4	13
Physiological Sci	550	96	2	6	40	7	67	3	16
Molecular Biology	375	100	3	3	41	5	76	5	12
Neuroscience	204	100	5	5	56	7	78	3	11
Chemistry	2,054	96	2	6	43	4	30	46	12
Mathematics	833	95	4	9	49	5	13	52	21
Physics	390	92	3	11	41	3	14	55	12
Economics	3,671	100	6	6	53	6	8	3	81
Political Science	1,757	105	11	6	66	7	6	1	91
History	512	105	11	6	62	12	6	2	83
Sociology	296	103	9	6	54	6	14	2	80

Methods and Findings on Major Participation and Course Workload

- Applying an 'induced course load matrix' approach at the level of individual student career workload

- Summarizing all UCLA coursework for students who entered as freshmen and graduated in a particular spring quarter cohort

- Graduates rarely take more than 50% of career workload in courses sponsored by the major program department

- The average is in the 30-40% range

- To reduce department course workload by **1** FTE student would require, on average, redirecting at least **2** majors (entering as freshmen) to other departments

**Percentage Distributions of Career Workload by Course Subject Area
for Spring 2003 Graduates from UCLA College with Single Majors in Selected Departments**

Course Subjects	ENGL	PSYCH AB	PSYCH BS	PHY SCI	BIOL	MICRO BIO	MATH	CHEM	PHYS	POL SCI	ECON	BUS ECON	HIST	SOC
ENGLISH	47	5	5	7	5	5	5	5	3	4	6	5	5	8
PSYCHOLOGY	2	38	27	3	2	2	1	2	2	3	2	1	2	3
PHYSIOL SCI	1	1	1	23	1	-	1	1	1	1	1	1	1	1
BIOLOGY	1	3	13	10	25	11	1	10	1	1	1	1	2	1
MICROBIO	1	-	-	1	2	19	1	3	-	1	1	1	1	-
MATHEMATICS	2	3	5	5	6	4	39	7	15	2	6	5	2	3
CHEMISTRY	2	2	15	16	17	20	2	36	3	1	2	1	2	1
PHYSICS	1	3	7	7	7	7	5	7	40	1	1	1	1	1
POLITICAL SCI	2	1	1	-	1	1	-	1	1	34	2	1	3	2
ECONOMICS	1	1	1	1	1	1	8	1	1	2	29	27	1	2
MANAGEMENT	-	1	-	1	-	-	7	1	-	1	9	21	1	1
HISTORY	4	3	3	3	3	2	3	3	3	9	5	3	39	7
SOCIOLOGY	1	2	1	-	1	-	-	-	-	2	1	-	1	26
All Subjects	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N Graduates	81	131	73	73	64	50	63	59	13	138	130	119	81	72
Max Subject	45	38	27	23	17	20	39	36	40	34	29	27	39	26
Subjects > 5%	47	44	72	67	60	62	63	65	54	44	54	58	44	40

Header note: Major Department at Graduation

% of Career Workload in Major Department and Other Departments with > 5% of Total

Legend: ■ Internal Workload □ Other Departments > 5%

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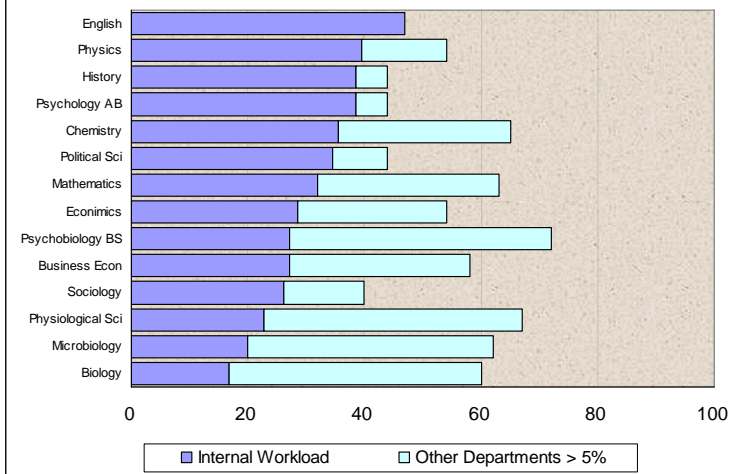
Second Base
The Differences Mobility Makes

- Differences in Time to Degree (TTD)
- Differences in Career Workload

- … due to the Timing of Mobility
- … due to the Number of Changes

- … for 'Undeclared' versus 'Declared' Entrants
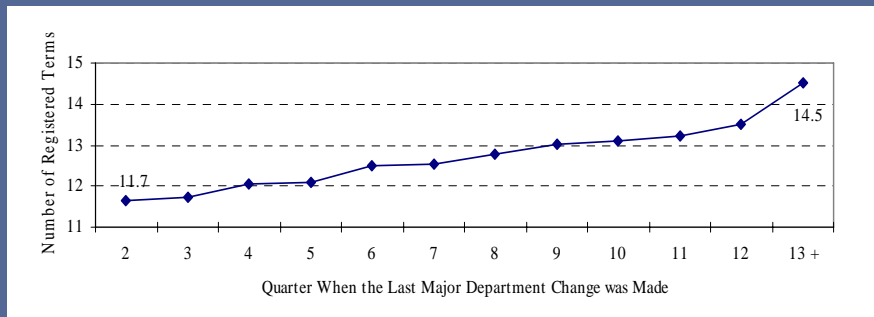- … for Double/Joint Majors

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- Fall 97, Fall 98, Fall 99 cohorts of high school direct entrants who graduated within six years

- A single major change does not result in significant increase in TTD and total UC units.

- Adding a second major for a double or joint major increases TTD and total UC units.

- Units for the second major are largely earned through summer sessions and increased workload.

- Changing a major AND adding another major significantly increase average TTD and career workload.

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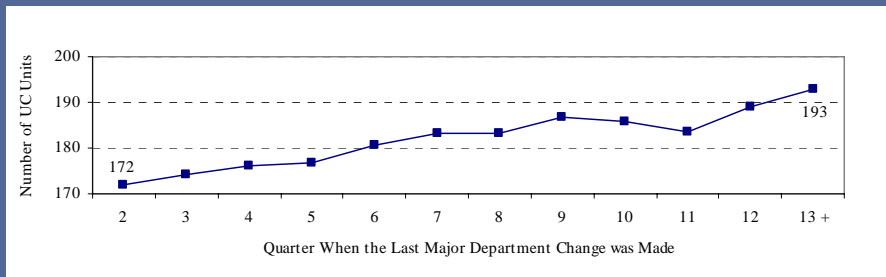## Overall Effects of Major Mobility on Time to Degree and units at Graduation

Academic Career Path*	Single Major			Double/Joint			Total		
Graduated In:	Quarters	UC Units	N	Quarters	UC Units	N	Quarters	UC Units	N
Entry Department	12.4	177	3,110	13.0	201	413	12.5	180	3,523
Different Dept in Entry Division	12.6	180	1,057	13.5	206	122	12.7	182	1,179
Different Division	12.6	178	1,805	13.5	204	164	12.7	180	1,969
Any Division -- Undeclared Entry	12.4	176	3,519	13.1	198	450	12.5	179	3,969
Total	12.5	177	9,491	13.2	201	1,149	12.5	180	10,640

* For double majors, placement is governed by the first major, the added major can be in any school or division.

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A significant correlation between timing of the last major change and TTD


14.5

11.7

Number of Registered Terms (y-axis: 11 to 15)

Quarter When the Last Major Department Change was Made (x-axis: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 +)

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Also a significant correlation between timing of the last major change and the number of UC units

Chart: Number of UC Units (y-axis, 170–200) versus Quarter When the Last Major Department Change was Made (x-axis, 2 to 13+). Values rise from 172 at quarter 2 to 193 at quarter 13+.

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The number of major changes is significantly correlated with both TTD and UC units to degree

Number of Changes	Registered Quarters to Degree	UC Units Passed	N
No Change	12.4	178	6,790
Changed Once	12.7	181	3,268
Changed Twice	13.0	188	502
Changed 3 Times or More	13.3	194	80
Total	12.5	180	10,640

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58% of declared entrants eventually change majors, but only 14% of 'undeclared' entrants ever change from the first major that they declare
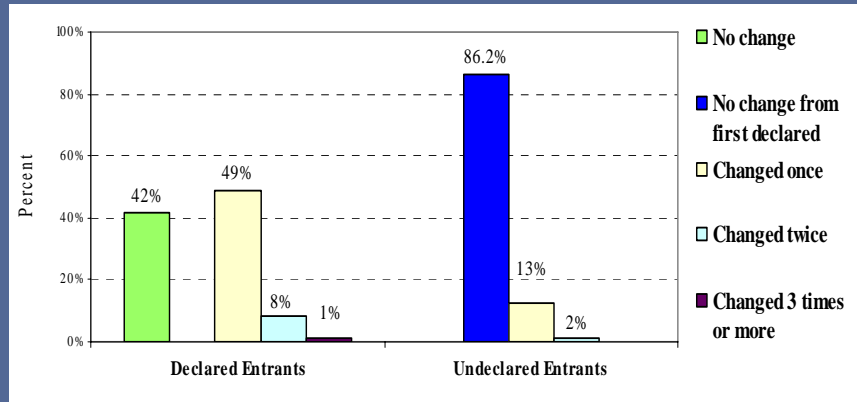
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Third Base
Why Change Majors?

- What major-changing students said about major change in UCUES 2006

- Underlying factors

- Clusters based on factor scores

- Characteristics of students in clusters
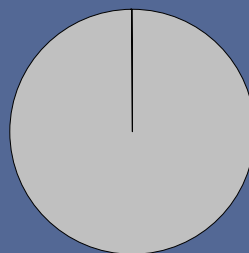
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UCUES Spring 2006 - UCLA Wildcard Module

Have you changed major at least once since beginning your studies at UCLA (excluding change from 'undeclared' to your present major)?

Please answer 'yes' if you made a significant effort to fulfill prerequisites or requirements for another major, even if you never officially declared it.

If 'yes' –

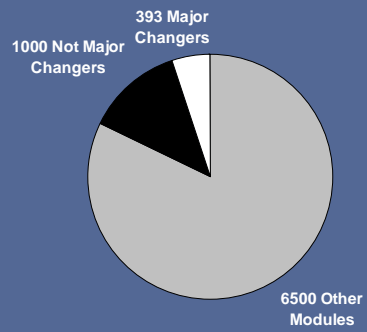**What prompted you to leave that major?**

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UCLA - UCUES Spring 2006

7900 UCUES Respondents

UCLA - UCUES Spring 2006

1400 Wildcard Module

6500 Other Modules

UCLA - UCUES Spring 2006

393 Major Changers

1000 Not Major Changers

6500 Other Modules

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UCLA Wildcard Module - UCUES Spring 2006

Reasons for Changing Major Cited by 393 Major-Changing Respondents
(- Check all that apply -)

I became more interested in another subject	54.5%
My career plans changed	32.1%
The preparatory classes weren't interesting	25.2%
The courses were too difficult	25.2%
The classes in the major weren't interesting	24.9%
My grades were too low	21.9%
Other students were too competitive	20.9%
My previous major did not deal with "real world" issues or applications	17.8%
The graduation requirements were too extensive	10.7%
I wanted a major that left more time for other activities	10.2%
I couldn't get into the classes needed	8.4%
I needed a major that left more time for employment	4.3%

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FOUR FACTORS with TOP-LOADING ITEMS

TOO HARD
My grades were too low
The courses were too difficult
Other students were too competitive

NEED TIME
I wanted a major that left more time for other activities
I needed a major that left more time for employment
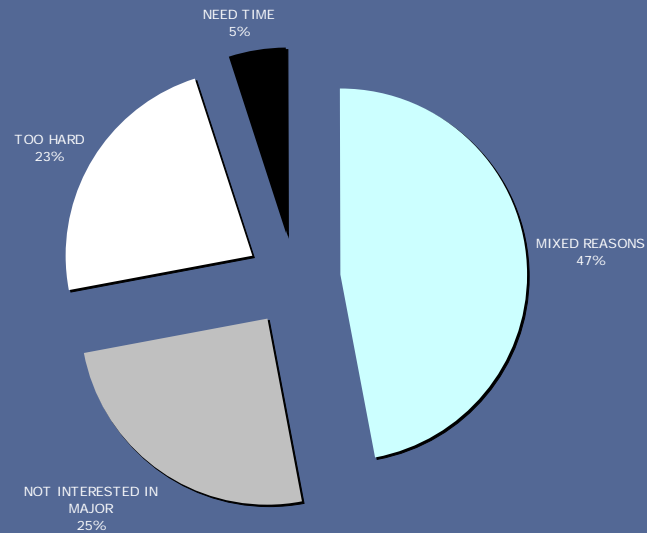The graduation requirements were too extensive

NOT INTERESTING
The preparatory classes weren't interesting
The classes in the major weren't interesting
My previous major did not deal with "real world" issues or applications

GOALS CHANGED
My career plans changed
I became more interested in another subject
I couldn't get into the classes I needed

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Comparing Cluster Groups

- With 393 respondents, subgroups are too small for detailed comparisons

- Instead, create two broad groupings based on:
  - Academic Composite of SAT & HS GPA
  - Satisfaction Composite of 4 Satisfaction Questions:
    - UC GPA & Academic Experience & Social Experience & Value of Education for Price

- Then separate major-changers into four equal groups by Academic Composite and by Satisfaction Composite

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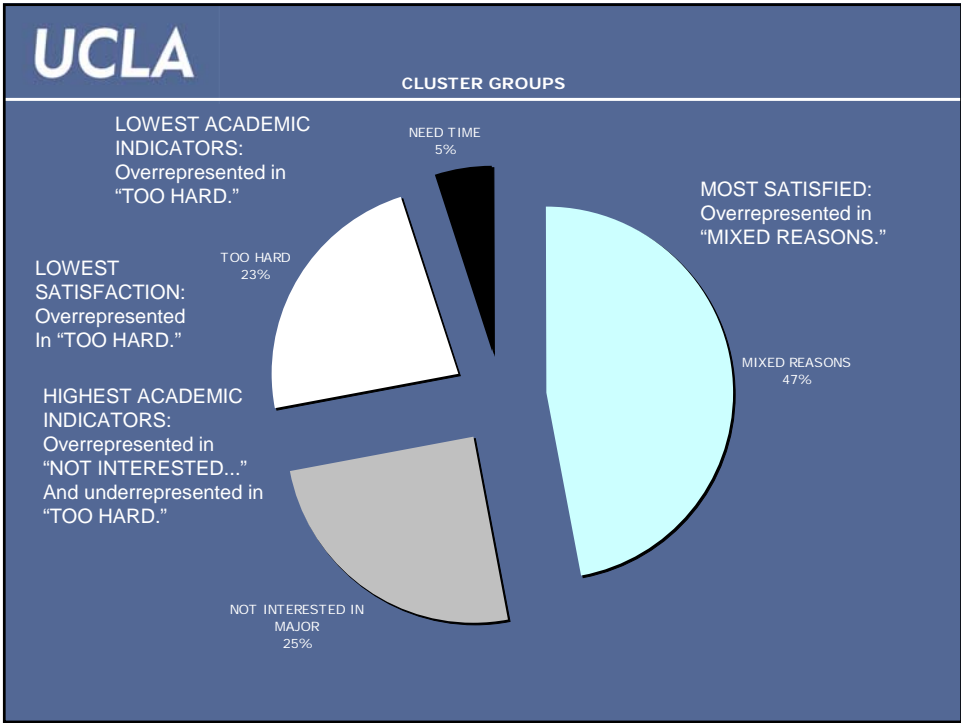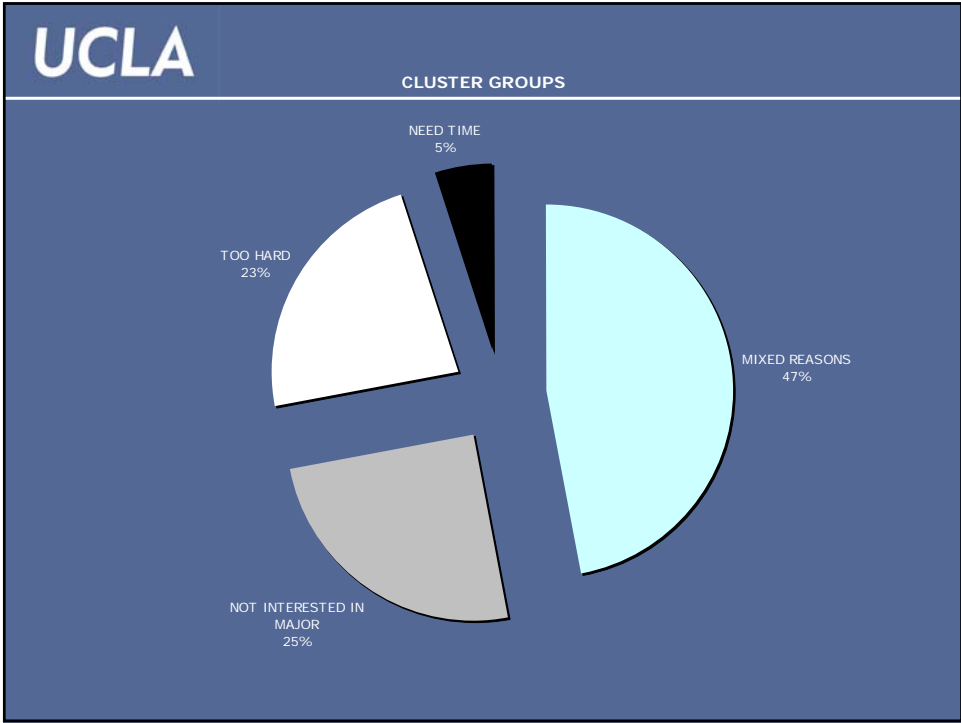
MAJOR-CHANGER FINDINGS

- Patterns in UCUES item endorsement suggest underlying reasons for changing majors

- These underlying reasons characterize student groups according to their motivations

- Further research with a larger sample would be needed to test the item bank, adding nuance and demographic/discipline comparisons

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Home Plate

- Where do we stand?

  - Putting it all together
  - What we have learned
  - What we have done with it
  - What difference it has made so far

- What's next?

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Major League

Studying How Students Move Through Majors and What Difference It Makes

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  - UCLA Office of Analysis and Information Management

  - Please send questions and comments to:
    - rcox@ponet.ucla.edu