Outline

- conferencing

- status/confidence

- poster presentation

- good/bad poster

- elevator speech exercise

‚conferencing'

networking

Image: British Science Association

self promotion

promote your work

Image: www.huffingtonpost.com

Image: http://authorunlimited.com

‚conferencing'

- getting feedback on your work
- building public identity
- training professional skills

‚conferencing'

- invite people ahead of time

- one month before: list of scholars to meet & why

- know the conference program - business card

status

status

- status is about being in control

- being in control -> being confident

- other exercises to be confident

  - practice, practice, practice

  - confidence boosts

  - power poses

confidence

- posture
- body language
- don't be submissive
- don't be apologetic
- no mumbling/rambling, laughing too much, don't be humorless, no grubby clothes/ungroomed hair

Image: Ads of the World

confidence

- look busy
- don't lurk in corners
- don't cling to people

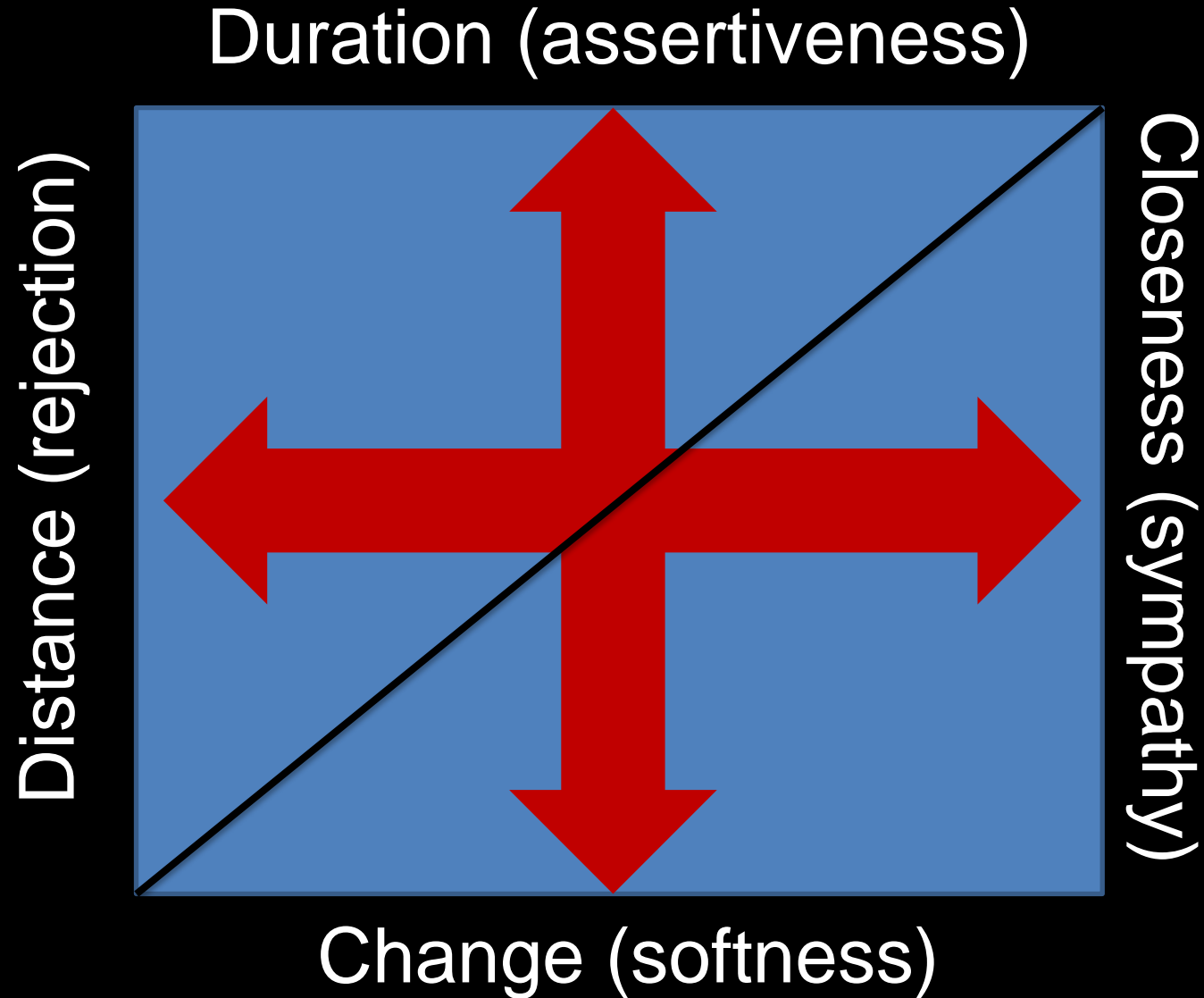# the status model

4 cases

inner/outer status

low/low	Teamplayer
low/high	Arrogant
high/low	Charismatic
high/high	Go-getter

the status model

Duration (assertiveness)

Distance (rejection)

Closeness (sympathy)

Change (softness)

the status game

- how do you want to be perceived?

- high status overlooks low status type

- status is communicated by posture, voice, non-verbal communication

- sometimes, low status of advantage

- flexibility

the status game

Good eye contact	Avoids eye contact
Friendly smile	Slouches
Good posture	Closed body language
Presence	Makes himself small

status @ conferences

- status, everywhere
- get attention

Image: www.parenting.com

You've been postered?

What is the purpose of your poster?

- discussion about the content?

- looking for a collaboration?

- feedback on your work?

- advertising your work?

- promoting yourself?

How to make a high-impact poster

- The science should rule, but well presented
- Show the bigger picture of your work and its context
- 'Why is it important?'
- No one wants to read an essay
- Purpose of your poster (Collaboration? Discussion?)
- Catchy title: 'headline style'
- What is original and special about your project
- Present only necessary content to convey your message
- Show links to previous works/give references to literature

Format suggestions:

- Abstract not necessary:

  A poster is supposed to be the illustrated abstract
- Top to bottom, left to right
- Logical flow
- Section titles: short sentences
- Mostly graphics
- Text: only short phrases, bullet points
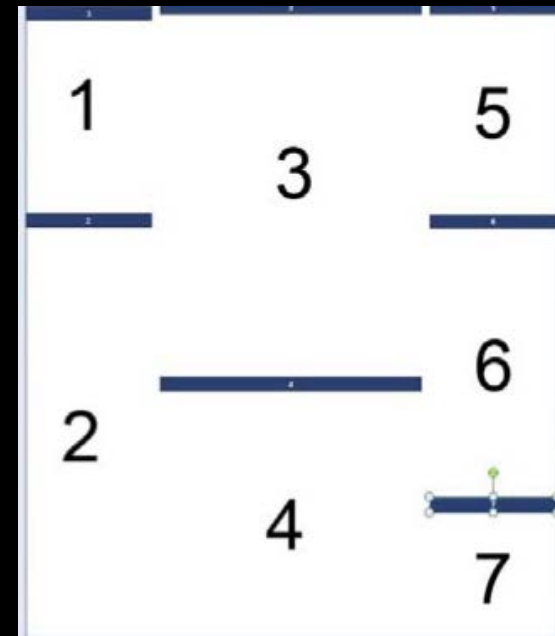
Format suggestions:

- Font size: approximately 24-36, headings 72-100, title bigger (maximum 2 line title)
- Font style: use sans serif fonts (or Helvetica, Arial, Calibri)
- Stick to 2-3 colors
- No distracting background
- Leave some white space
- Good contrast colors

It is a poster *presentation*

- Don't just stand by your poster, talk to people

- Be prepared: **4-5 sentences in 1 minute**

  ‚**elevator speech**'

  - What is my poster about?

  - Why is it important?

  - What did I do?

  - What are my results?

  - Take-home message

How to present ?

- don't be distant – don't be too eager

- walk through your poster in a logical way

- take advantage of your presence

  - supplemental handouts?

- use your poster as a visual tool

  - point to graphs/images

How to present ?

- eye contact
- talk to the whole group
- dress professionally
- ask questions ('How would you have done it?')
- give the visitor time to read
- be engaging: attract attention
- speak slowly
- don't read your poster
- talk to people who disapprove of your work too

How to answer questions?

- If answer is not on poster: have supplemental material/paper etc.

- If you can't remember the answer: give note/card with your email

- If you don't know the answer, beyond scope of my research. Don't make things up. Ask: How might you address the question? Collaboration? Ask the viewer about his/her opinion

What else?

- go up to people who work in your field for feedback

- don't wait for the poster session

- how can you be contacted?

    - business cards

    - copies of relevant papers

    - copies of your poster in A4 (if published)

- you can't be next to your poster all the time:

    - leave pen & pad of paper with your poster

Examples of good posters

Attenuated Total Reflection Spectroscopy on a One-Step-Extract from Saliva utilized for Cocaine Detection

Kerstin M.-C. Hans, Michele Gianella, Matthias Müller and Markus W. Sigrist

ETH Zurich, Institute for Quantum Electronics, Laser Spectroscopy and Sensing, Zurich, Switzerland

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Introduction, goals, challenges and solutions

Lab-on-a-chip-sensors are powerful tools in diagnostics, e.g., detecting drugs in body fluids, due to their low costs and quick results. Saliva serves as a better matrix than blood or urine because it can be collected non-invasively and by less trained staff. Up to now there is a lack of easy-to-use quantitative methods.

Current Situation:

Stopping car due to initial suspicion → checking for drugs → collect Saliva

Negative: driver continues   Positive: driver needs to provide a blood sample for lab analysis

Future perspective with industrial partner:

Stopping car due to initial suspicion → Collect saliva → Semi-quantitative analysis for cocaine on a microfluidic chip with infrared spectroscopy (maybe no further need for 2nd analysis)

Problems:
- Relative high false positive/negative results [1]
- No quantitative result on the street (risk assessment)
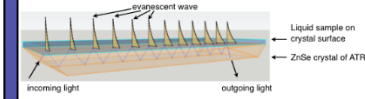- Second expensive test analysis necessary

Challenges:
High water and water vapour absorption → Drug extraction on the enclosed chip
Interfering substances → Extensive prestudies [2]
High sensitivity needed for determining cocaine & metabolites → Lower limit of detection and potential preconcentration

Method: **A**ttenuated **T**otal **R**eflection (ATR) spectroscopy

evanescent wave
Liquid sample on crystal surface
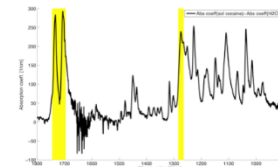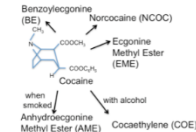ZnSe crystal of ATR
incoming light   outgoing light

- ATR spectroscopy is selected as promising method for absorption measurements in liquids
- Broadband studies were performed with an FTIR Spectrometer (Paragon 1000 PC) equipped with an ATR unit
- In the ATR unit the light is reflected eleven to twelve times in a ZnSe crystal creating an evanescent field. This field is penetrating the sample. In consequence a decrease in intensity of the outgoing light is correlated with absorption of the sample.
- Measurements within selected narrow spectral ranges are currently performed with QCLs

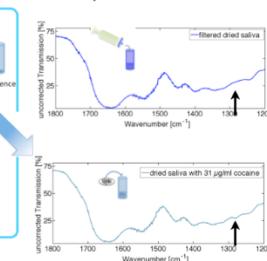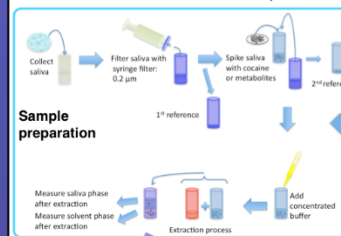## Challenge of low detection limits

- **Cocaine** concentration in saliva is up to 500 µg/ml [3]
- BE concentration is up to 3 µg/ml [4]
- EME concentration up to 0.2 µg/ml [5]
- NCOC concentration up to 0.1 µg/ml [3]
- AME concentration up to 4 µg/ml [3]

Metabolites of cocaine according to [6]:
Benzoylecgonine (BE)   Norcocaine (NCOC)
Ecgonine Methyl Ester (EME)
Cocaine
when smoked   with alcohol
Anhydroecgonine Methyl Ester (AME)   Cocaethylene (COE)

- Black: suspension of water and cocaine flakes (@1260 µg/ml) after water background subtraction
- Yellow boxes indicate the areas of strong cocaine absorption

Sample extraction and spectra

Collect saliva → Filter saliva with syringe filter: 0.2 µm → Spike saliva with cocaine or metabolites → 2nd reference
1st reference
Sample preparation
Measure saliva phase after extraction
Measure solvent phase after extraction → Extraction process → Add concentrated buffer

Spectrum of dried saliva: without cocaine and spiked with cocaine; the appearance of the **cocaine peak** around 1280 cm⁻¹ is clearly visible and marked with a black arrow (peaks at ~1740 cm⁻¹ only visible in the ratio)

FTIR-spectra of saliva and solvent phase after the extraction: => cocaine peaks in saliva disappeared, but appear in solvent

best tested solvent for extraction: Tetrachloroethylene

Ratio of several transmission spectra:
- values <1: cocaine absorption
- values >1: difference in drying patterns
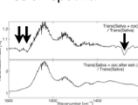
Reference samples and spectra

Extraction solvent → solvent spiked with cocaine → solvent for baseline determination
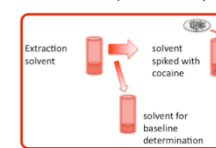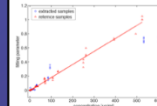
For comparison and determination of extraction efficiency => investigation of reference samples

- spectrum of dried reference sample and spectrum after extraction almost identical
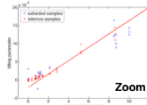- **extraction efficiency >80%**
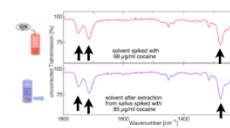
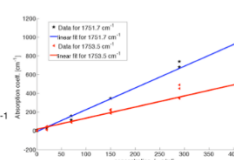## Extraction efficiency determined with the FTIR

A low noise cocaine spectrum with subtracted baseline was used for the fit. Fit parameters vs. concentration => linear relation (r=0.993)

Extraction efficiency >80%
(often almost 100% within error)
(current LOD ~2 µg/ml)

Zoom

QCL measurement

Chosen wavelengths 1751.7 and 1753.5 cm⁻¹ with respect to the cocaine spectrum

Measurements of reference samples with one wavelength

Laser instabilities yield a current **limit of detection** with the **QCL** of ~ **20** µg/ml

Conclusions and outlook

- Successful one-step extraction of Cocaine, Cocaine.HCl and several metabolites from saliva
- Improved limit of detection with the help of extraction and dried samples (semi-quantitative results): currently ~2 µg/ml
- Measurements with QCL at 1751.7 and 1753.5 cm⁻¹ (supplied by Yargo Bonetti, ETH) very promising
- Combination of tunable QCL waveguide and microfluidics in progress

Literature
[1]Walsh et al., J. Anal. Toxicol 27,429 (2003)
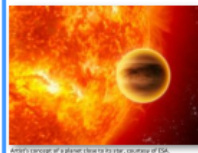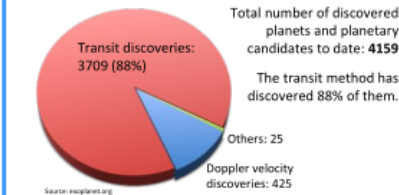[2] Hans et al., Drug Testing and Analysis, DOI: 10.1002/dta.346
[3] Jenkins et al., J. Anal. Toxicol. 19,359 (1995)
[4] Jufer et al., J. Anal. Toxicol. 30, 458 (2006)
[5] Moolchan et al., J. Anal. Toxicol. 24, 458 (2000)
[6] E.J. Cone et al., Clinical Chemistry 40(7),1299 (1994)

Studying the Atmospheres of Alien Worlds in Extreme Environments

PENN STATE

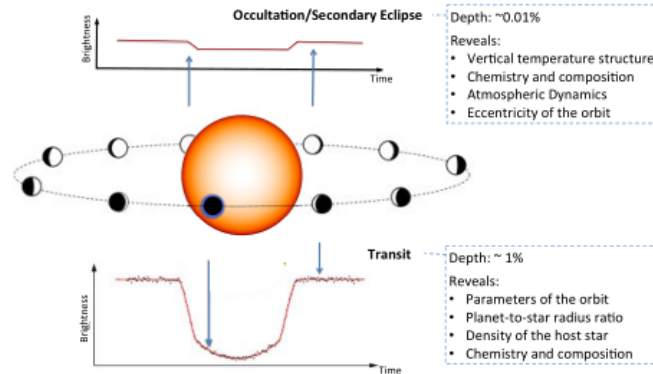Ming Zhao[1], Jason T. Wright[1], Heather A. Knutson[2], Joseph G. O'Rourke[2]

1. Department of Astronomy & Astrophysics, Center for Exoplanets and Habitable Worlds, Penn State University;
2. Division of Geological and Planetary Sciences, California Institute of Technology

Planet transit and occultation: unique ways to study alien atmospheres

Transit discoveries: 3709 (88%)

Total number of discovered planets and planetary candidates to date: **4159**

The transit method has discovered 88% of them.

Others: 25

Doppler velocity discoveries: 425

Source: exoplanet.org

Giant planet + Close distance to host star = Hot + Extreme environment

Close-in giant planets have relatively large transit or occultation depths, providing a rare opportunity to study their atmospheres.

Artist's concept of a planet close to its star, courtesy of ESA.

Occultation/Secondary Eclipse

Depth: ~0.01%

Reveals:
- Vertical temperature structure
- Chemistry and composition
- Atmospheric Dynamics
- Eccentricity of the orbit

Transit

Depth: ~ 1%

Reveals:
- Parameters of the orbit
- Planet-to-star radius ratio
- Density of the host star
- Chemistry and composition

Objectives:
- Detect atmospheric emission from a large sample of extra-solar planets
- Shed light on the physics and chemistry at work in those alien atmospheres
- Comparative study of the ensemble

Importance to the field:
- Study the diversity of alien worlds
- Gain important information to their formation histories
- Better define the Solar System's place in the Galactic neighborhood
- Pave the way for future studies of real Earth-like planets

Improving the instrument and observing techniques for cutting-edge science

Observing strategy:
Monitor the tiny brightness changes of the target with respect to other nearby stars

Part of a typical science image

Normalized raw flux from multiple stars
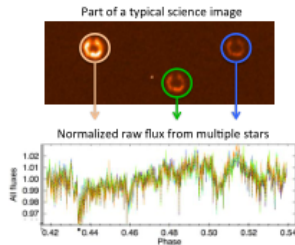
Large flux changes of different stars due to atmospheric turbulence are well correlated and can be corrected. However, the tiny, independent detector related errors are hard to correct.

Key to high precision: Precise guiding + Well calibrated detector + Stable stellar images
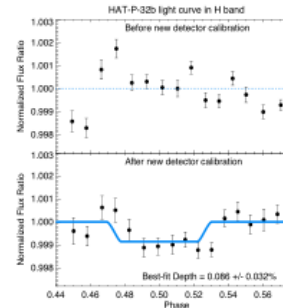
Better guiding precision:
We developed a new guiding algorithm, and improved the guiding precision by a factor of 5-7.

Manual Corrections UT2011Jan29

Large centroid drifts were corrected UT2011Jul27
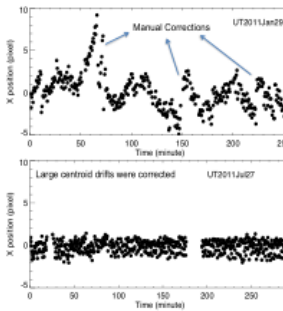
Zhao et al. 2012

Better detector calibration:
We developed a novel calibration scheme to calibrate the peculiar response of the infrared array detector.

HAT-P-32b light curve in H band

Before new detector calibration

After new detector calibration

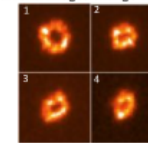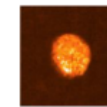Best-fit Depth = 0.086 +/- 0.032%

Zhao et al. 2013 in prep.

Smoother and steadier images:
We are developing a novel diffuser assisted photometry technique for much higher precision.

Current: images change with time

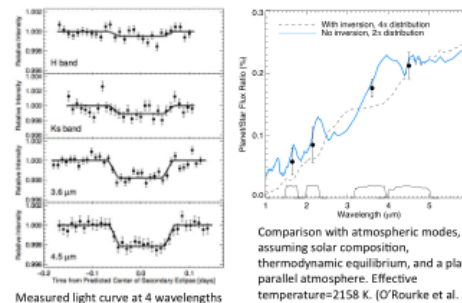Future: a diffuser will smooth and stabilizes the images

Results and Future Prospects

Detected atmospheric emission from 9 hot planets – 39% of all planets that have been detected at secondary eclipses from ground.

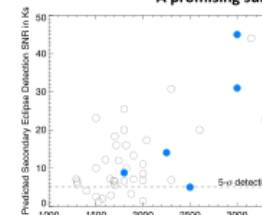Others' detections: 14

Our detections: 9

Our improvements to the instrument allowed us to reach a precision of 0.02-0.03%, among the best of ground-based observations.

Example: Wasp-48b – a hot giant gas planet without a stratosphere (temperature inversion) and has low energy distribution across the globe – very different from the Earth.

H band

Ks band

3.6 µm

4.5 µm

Measured light curve at 4 wavelengths

With inversion, 4x distribution
No inversion, 2x distribution

Comparison with atmospheric modes, assuming solar composition, thermodynamic equilibrium, and a plane-parallel atmosphere. Effective temperature=2158 K. (O'Rourke et al. 2013)

A promising survey ahead

Merely detecting the atmosphere at a single wavelength is not enough. Our improved technique will yield a consistent, multi-wavelength, high precision survey of a large sample of planets for comparison studies.

Blue dots: current published planets with multi-wavelength measurements.
Open circles: predicted detection SNR using our new diffuser technique.

5-σ detection

References:
O'Rourke, J. G., et al. 2013, ApJ, submitted.
Zhao, M. et al. 2012, ApJ, 748, L8
Zhao, M. et al. 2013, ApJ, in preparation.

Examples of bad posters

PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND AD LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS

Colin B. Purrington
6673 College Avenue, Swarthmore, PA 19081 USA

ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a long-term experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. Individuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight — and those at risk for overweight — to space would be a lasting cure.

INTRODUCTION:

The current obesity epidemic started in the early 1960s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constrictive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1965).

Luckily, at the same time that fabrics became stretchy, the race to the moon between the United States and Russia yielded a useful fact: gravity in outer space is minimal to nonexistent. When gravity is zero, objects cease to have weight. Indeed, early astronauts and cosmonauts had to secure themselves to their ships with seat belts and sticky boots. The potential application to weight loss was noted immediately, but at the time travel to space was prohibitively expensive and thus the issue was not seriously pursued. Now, however, multiple companies are developing cheap extra-orbital travel options for normal consumers, and potential travelers are also creating news ways to pay for products and services that they cannot actually afford. Together, these factors open the possibility that moving to space could cure overweight syndrome quickly and permanently for a large number of humans.

We studied this potential by following weight gain in Guinea pigs, known on Earth as fond of ad libitum feeding. Guinea pigs were long envisioned to be the "Guinea pigs" of space research, too, so they seemed like the obvious choice. Studies on humans are of course desirable, but we feel this current study will be critical in acquiring the attention of granting agencies.

MATERIALS AND METHODS:

One hundred male and one hundred female Guinea pigs (Cavia porcellus) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by duct-taping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

RESULTS:

Mean weight of pigs in space was 0.0000 +/- 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be alarmed push briefly against the force plate in the balance. Individuals on the Earth, the control cohort, gained about 240 g/month (p = 0.0002). Males and females gained a similar amount of weight on Earth (no main of effect of sex), and size at any point during the study was related to starting size (which was used as a covariate in the ANCOVA). Both Earth and space pigs developed substantial dewlaps (double chins) and were lethargic at the conclusion of the study.

CONCLUSIONS:

Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and Federal IRBs.

ACKNOWLEDGEMENTS:

LITERATURE CITED:

NASA. 1982. Project STS-XX: Guinea Pigs. Leaked internal memo.

Sekulić, S.R., D. D. Lukač, and N. M. Naumović. 2005. The Fetus Cannot Exercise Like An Astronaut: Gravity Loading Is Necessary For The Physiological Development During Second Half Of Pregnancy. Medical Hypotheses. 64:221-228

Xavier, M. 1965. Elastane Purchases Accelerate Weight Gain In Case-control Study. Journal of Obesity. 2:23-40.
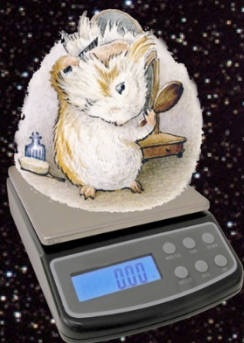
Elevator Speech

- Speak loudly enough

- Avoid filler words (um/like/you know)

- 5 sentences in 1 minute:

  1.) What is your poster/work about

  2.) Why is it important & what is the bigger picture?

  3.) What did you do?

  4.) What are the results?

  5.) What is the take-home message?

References

- Mike Dowman,
  http://www.lel.ed.ac.uk/~mdowman/mike_dowman_
  how_to_give_a_poster_presentation.html

- Karen Kelsky, 'How to work the conference',
  http://theprofessorisin.com

- Poster presentations, see e.g.,
  http://hsp.berkeley.edu/sites/default/files/ScientificP
  osters.pdf

PlanetS Professors input: What makes a good job application?

1. What is the main information you look for in the application letter (motivation to apply/past experience/general impression/suitability/etc.)?

- past experience/research (5)
- general impression (3)
- suitability (3)
- motivation (2)
- publications (2)
- courses/universities attended (2)
- grades (2)
- extracurricular activities (1)
- in the intro letter, applicants should demonstrate that they have done their homework and investigated the institute and context locally for the current position. it is also an opportunity to demonstrate they can write well: concise and well-organized.

2. Based on which information do you mainly evaluate the applicant's research quality?

- Publications (quality and/or quantity) (6)
- Recommendation letters/references (4)
- Job interview (2)
- creativity, independence, ability to find the right problem to work on given the current state of the field and current constraints (tools available on-hand).

3. If you think back on a job application that caught your attention, why did it stand out (positively or negatively)?

- Applicant was not aware about the work being done at our institution and asked me what I was working on…
- CV with an inappropriate photo
- CV promised more than there was
- Bad formatting
- Excellent achievements
- Not mainstream expertise or experience or high research output
- Unique opening in the intro letter
- High research productivity
- Innovative science
- General impression, only the essential points identified and described in the application

4. Other than bad spelling, is there something in a CV that immediately disqualifies the applicant?

- Arrogance/exaggerations (2)
- Bad research plan
- No experience at all in astrophysics.
- We get a LOT of applicants that have almost no qualification for the job. You dont need to be at the 95% level but < 10% towards the job is just silly.
- "Template application" that has obviously been sent to numerous other places
- Incomplete CV, "missing" years
- No important first author paper
- Lack of reference to the ad, poor formatting
- Very poor organisation

# 5. Which three skills/qualities about the applicant do you hope to see covered in a recommendation letter?

- Personality/Team player (5)
- Independence (4)
- Perseverance/endurance (4)
- Lab/technical skills (3)
- Creativity/innovation (2)
- Ambition/enthusiasm/motivation (2)
- Knowledge of astrophysics (2)
- Their work in detail (Data analysis, modelling, lab. work?)
- Potential (what level will the applicant achieve)
- Organisational skills
- I don't pay much attention to recommendation letters as they are usually always good.

6. How important is the applicant's number of publications for you?

10.0% Not important at all:

20.0% Very important:

70.0% Somewhat important:
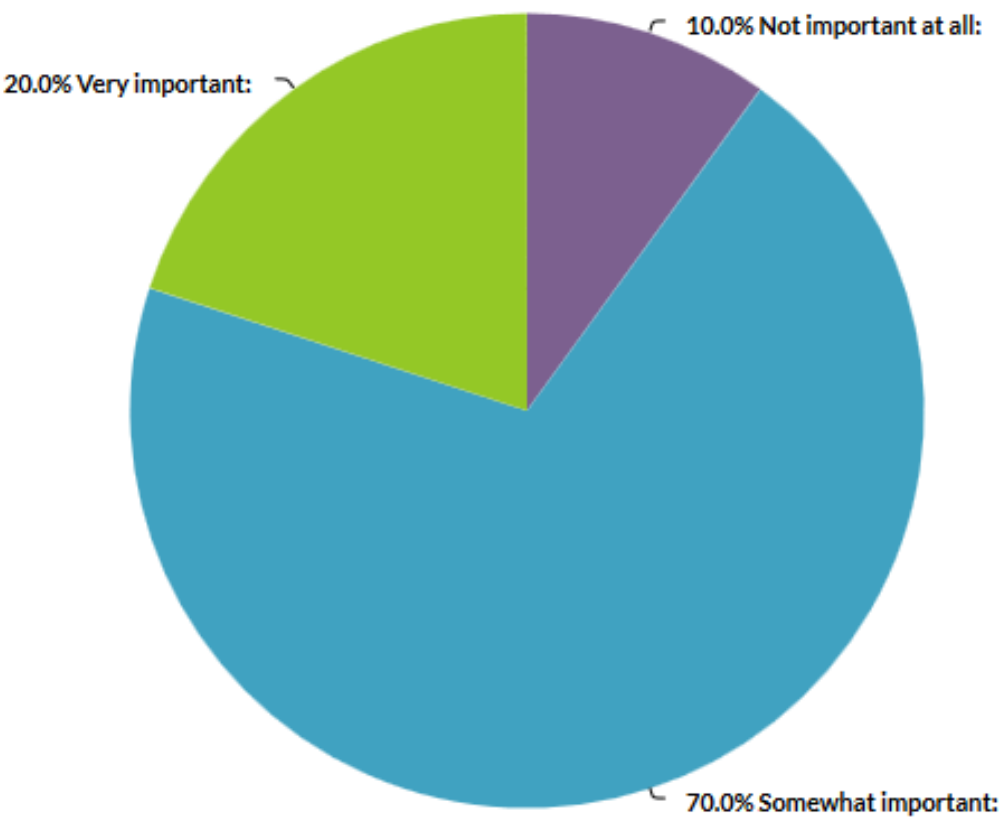
Value	Percent		Count
Not important at all	10.0%		1
Somewhat important	70.0%		7
Very important	20.0%		2
	Total		10

7. How important are the applicant's international collaborations for you?

20.0% Very important:

30.0% Not important at all:

50.0% Somewhat important:
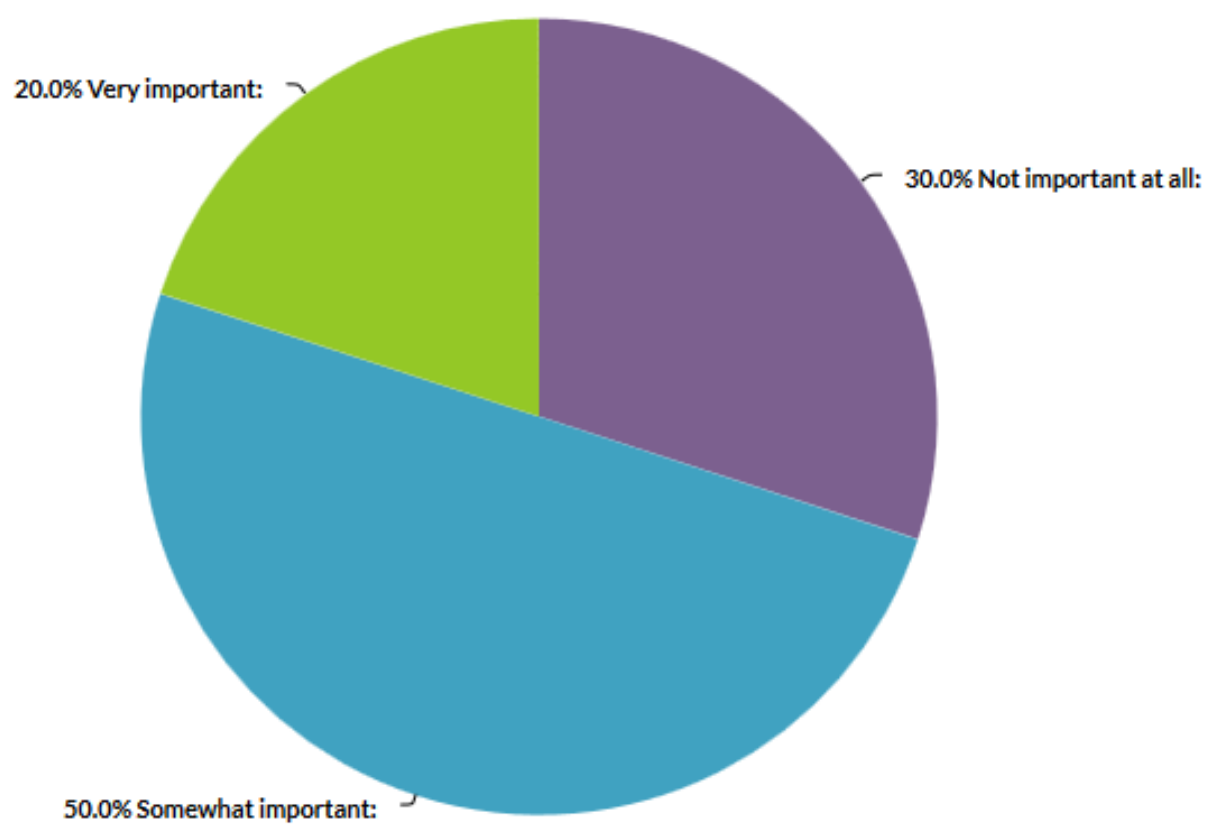
Value	Percent		Count
Not important at all	30.0%		3
Somewhat important	50.0%		5
Very important	20.0%		2
	Total		10

8. How important is the applicant's teaching experience for you?

20.0% Somewhat important:

80.0% Not important at all:

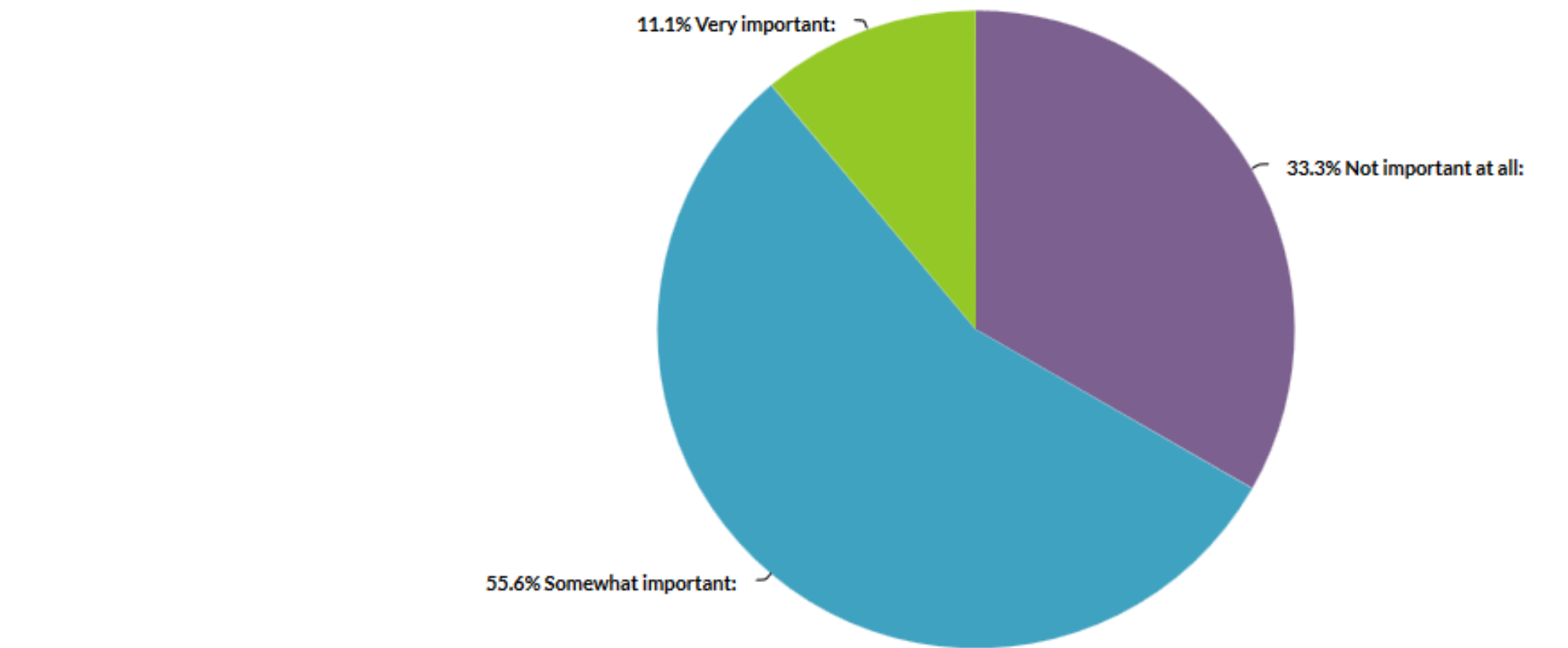| Value	Percent		Count
Not important at all	80.0%		8
Somewhat important	20.0%		2
		Total	10
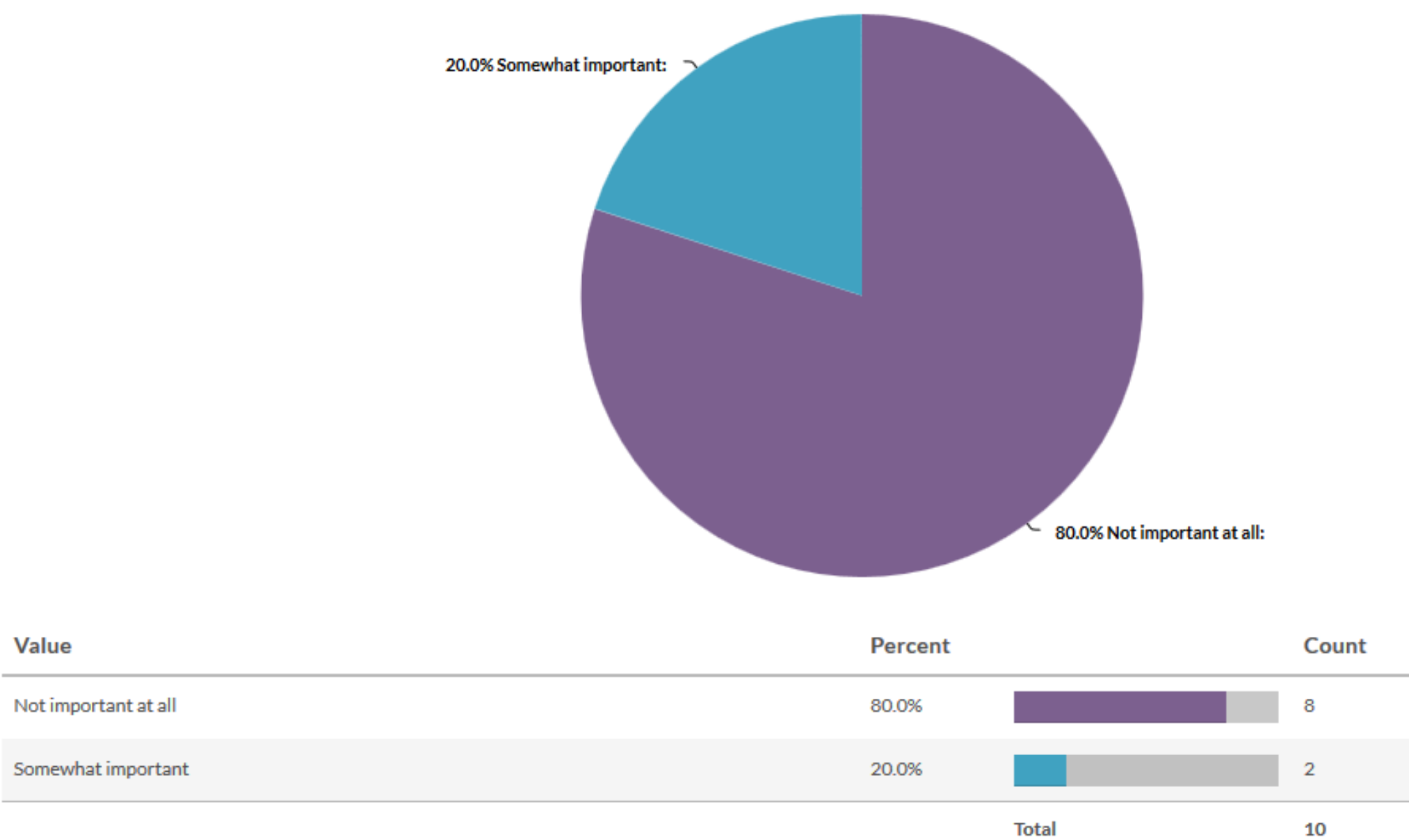
9. Does the recommendation letter have a greater impact if you know the author and/or if the author is from a well-known institution?

11.1% Not at all:

88.9% Yes:
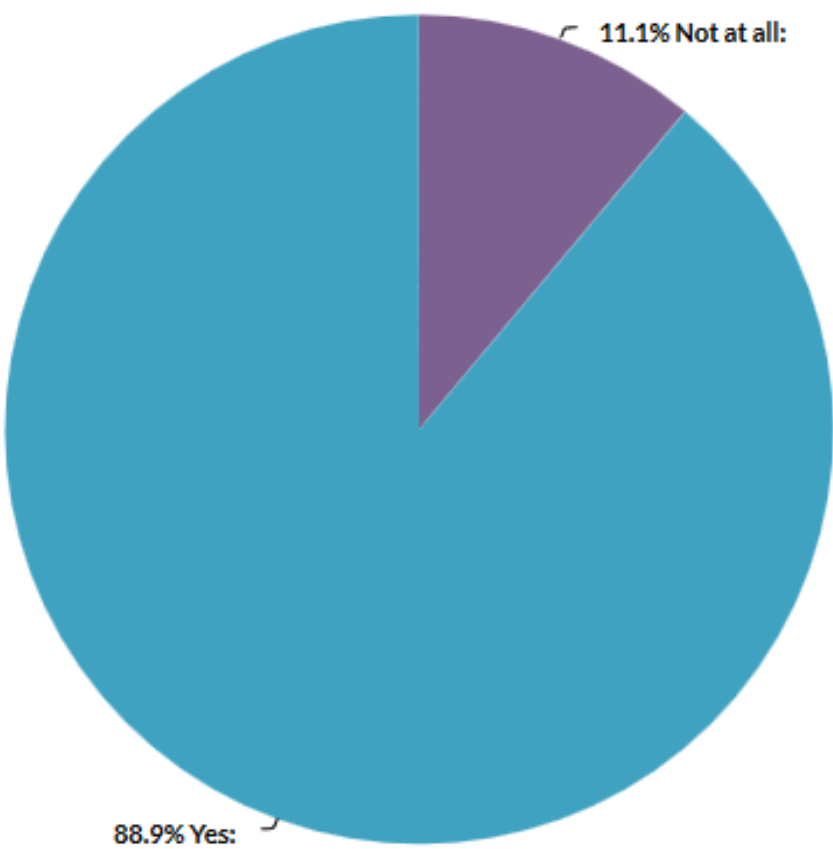
Value	Percent		Count
Not at all	11.1%		1
Yes	88.9%		8
		Total	9

10. How important is diversity (gender/age/etc.) when you rank applications?

11.1% Very important:

33.3% Not important at all:

55.6% Somewhat important:

Value	Percent		Count
Not important at all	33.3%		3
Somewhat important	55.6%		5
Very important	11.1%		1
		Total	9

11. Is there personal advice (or any other comment) you can give concerning an application?

- Research the institute/colleagues you apply to! (3)
- Contact people personally, do not trust in written applications alone, give yourself a chance the present yourself to the person who has to decide.
- Make applications even if you dont fit the job precisely. NOBODY fits the job precisely. Emphasize what you CAN provide.
- Make sure your reference has a copy of the ad you are applying to.
- Never exaggerate, but try to place yourself in the best possible light. Don't lie, you may end up with a job you do not really want.
- Show that you have the fire for science in you.
- A well focused research plan