Strategy Workshop:

Psychology on the MCAT

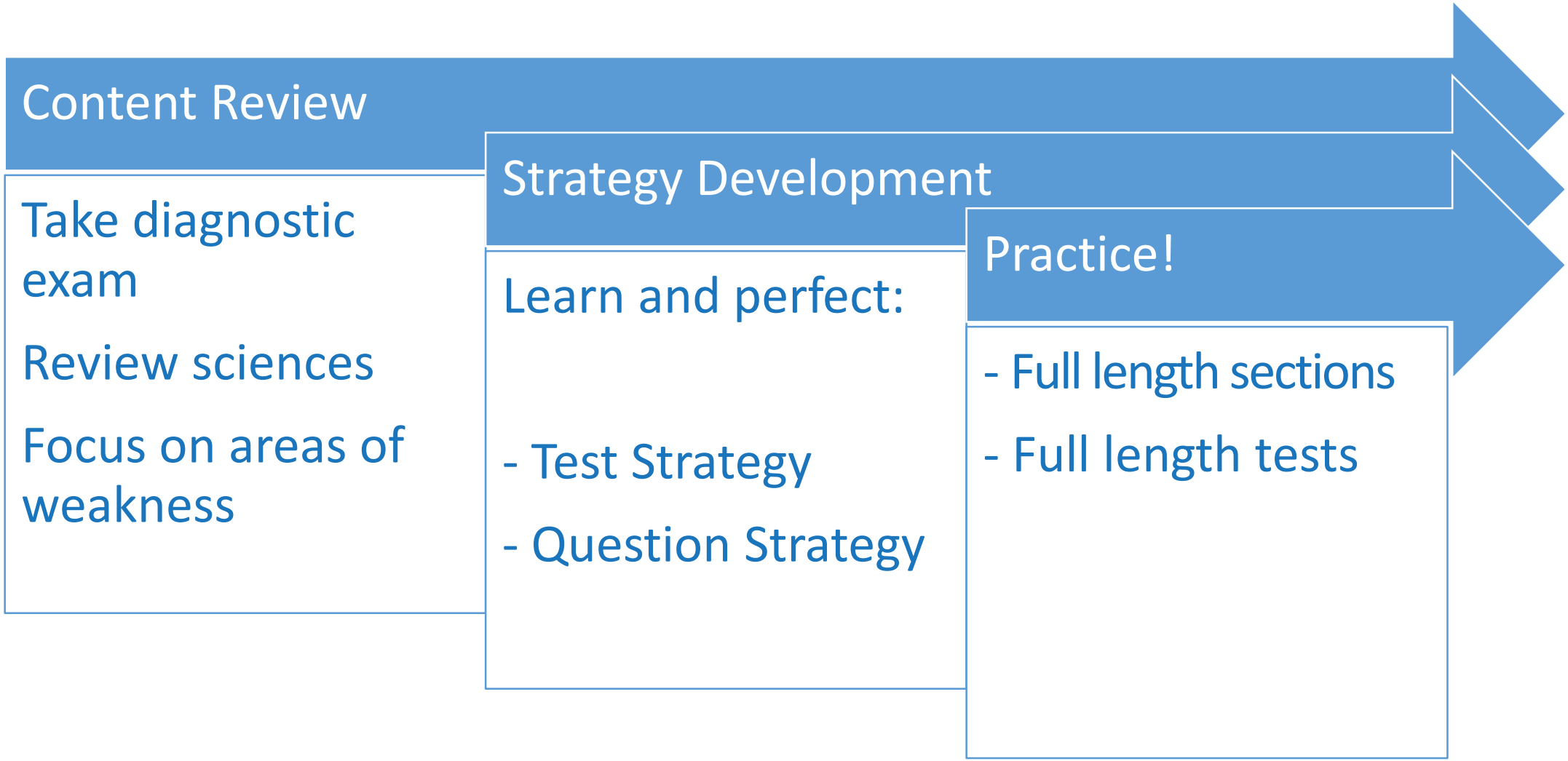
Introductions

- Clara Gillan
  - Sr. Content Developer
  - Veteran MCAT Tutor

- Worked with hundreds of students, written and reviewed thousands of MCAT questions

- Personally achieved a 42 MCAT (14's in each section).

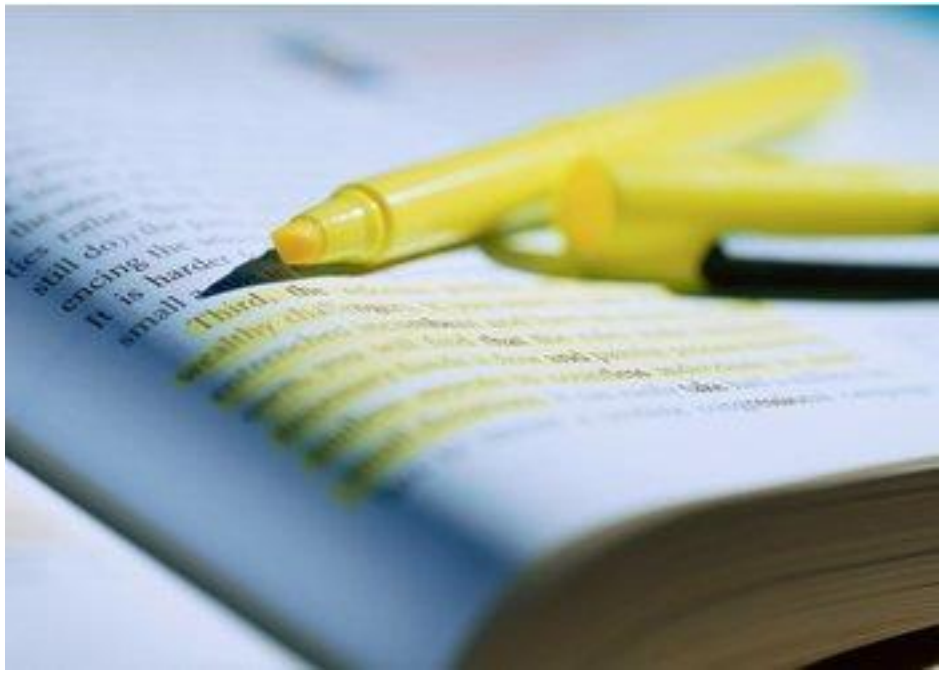
Prepping for the MCAT



How to highlight

- Read briskly, use highlighter to capture key points!

- What to look for:
  - Opinion
  - Points of contrast
  - Cause and effect!



Psychological, Social, and Biological Foundations of Behavior Passage 1

Researchers sought to connect maternal stress to low birthweight by examining a population of 130 low socioeconomic-status women from the Los Angeles metro area. Scientists hypothesized that maternal stress was linked to low birthweight due to hormonal and other physiological changes associated with stress, such as elevated catecholamine levels, decreased visceral blood flow, and elevated cortisol levels.

The study participants were all women seeking prenatal care at free clinics. Participants were enrolled only if they were over the age 18 and under 40, presented for their first appointment within the first two months of pregnancy, and continued prenatal visits throughout pregnancy. Women were interviewed at each prenatal appointment, at least five times each, and on average seven times throughout pregnancy. Researchers noted that at these free clinics there were no Spanish-speaking doctors, despite over half of study participants only speaking Spanish. Doctors also spent very little time with each patient and seemed too rushed to discuss health concerns fully with each patient.

An index of the latent variable stress was created through assessments of three different factors: environmental (event) stress, perceptions of stress, and affective responses to stress. The first was measured by asking the women to report on adverse life events that happened to friends and family (everything from mundane stressors like moving, to larger stressors like losing a job, to potential trauma like being a victim of a crime were included). Perceptions of stress were assessed through surveys about how the adverse life events were perceived, ranging from “not at all stressful” to “extremely stressful”. Finally, affective response was measured through anxiety inventories.

Finally, patients were also extensively interviewed about their medical background, especially with respect to medical conditions that present serious risk during and after pregnancy and labor to generate a “medical risk” score. Birthweight was measured in grams as a continuous variable, rather than classifying the newborns in broad categories. This more specific data allowed the correlations developed below to be analyzed with a high degree of statistical significance.

Figure 1: Correlation matrix of study results

	Stress	Event distress	Perceived Stress	Anxiety	Medical Risk	Birthweight
Stress	1	0.44	0.84	0.80	0	-0.31
Event Distress		1	N/A	N/A	0	-0.18
Perceived Stress			1	N/A	0	-0.28
Anxiety				1	0	-0.29
Medical Risk					1	-0.15
Birthweight						1

Interpreting Figures on the MCAT

When reading the passage:

- Mind your axes
- Units matter
- Sum up trends, move on

When answering question:

- Who is the control?
- Deep dive on trends
- Don’t assume you need the figure

Figure 1: Correlation matrix of study results

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Medical Risk					1	-0.15
Birthweight						1

1. The research described in the passage, which takes into account numerical measures of birthweight, survey reports of anxiety, and reports of life events related to friends and family best fits under what model of public health analysis?

A) Medical model

B) Biopsychosocial model

C) Psychosocial model

D) Cohort study

2. Which of the following identifies a potential methodological flaw in the study?

A) The study's sample size was far too small to allow for correlations with any statistical significance to be drawn.

B) By only assessing maternal and not paternal stress, researchers missed out on key data that would be essential to assessing the effect of parental stress on fetal health.

C) It is already well known that low birth weight correlates with preterm labor so the research findings are redundant.

D) By only working with women who had already chosen to come in for prenatal care very early in their pregnancies and to receive very frequent prenatal checkups, the researchers were working with a sample that may be unrepresentative.

3. According to the study results, which of the following women would be most likely to give birth to a low birthweight baby?

A) A first-time mother who was many years younger than the average age in the study
B) An unmarried woman with several medical risk factors but almost no event distress
C) A woman who reports a high level of anxiety and perceived stress but a low medical risk
D) A Latina woman with strong social networks and a large amount of event distress but low anxiety

4. Assessing a latent variable like stress through a series of surveys that create numerical results is an example of:

A) operationalization.
B) ethnocentrism.
C) medical bias.
D) external validity.

5. The study found that medical risk was not correlated with stress, despite the natural assumption that a woman who has many risk factors would be expected to experience stress about those factors. This lack of correlation may best be explained by:

A) the unusually robust health of study participants.
B) the fact that the women in the study were too focused on their high level of distressing life events to worry about their own medical risk factors.
C) the mothers' unawareness of their risk factors.
D) cultural differences between the doctors and patients.

Top 3 Tips for Managing the MCAT

- Move through the test in order
- Stick with your first answer, unless you can PROVE it wrong
- Create a love/hate relationship with the clock

Questions?

How Can Next Step Help?

Realistic MCAT Testing Platform

Pause

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FULL LENGTH 1

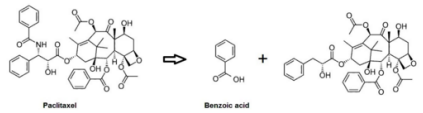
Remaining Time
01:34:35

Chemical and Physical Foundations of Biological Systems Passage 1 (Questions 1-4)

Pharmaceuticals that disrupt the microtubules of cells during the cell reproduction process can be an important component of treating such medical conditions as Kaposi's sarcoma and ovarian tumors. Paclitaxel is one such example of a pharmaceutical in this category, often known as "mitotic inhibitors."

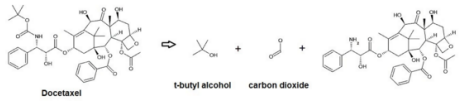
Research into medicines with bioequivalent properties to paclitaxel could lead to the discovery of ways to achieve similar effects with different molecular substances. One example of such research involved hydrolysis of paclitaxel molecules in an attempt to study the molecule's individual components. A diagram of one of the paclitaxel molecules in question appears below, along with post-hydrolyzed components.

Figure 1 Hydrolyzed products of paclitaxel



One developed drug that was found to have been roughly bioequivalent to paclitaxel is docetaxel, also in the taxane family. Docetaxel affects the centrosomes of mitotic spindles.

Figure 2 Hydrolyzed products of docetaxel



Attempts were made to purify a number of the various compounds involved for purposes of further physical and chemical property testing. Further pursuit of the research involved required using a number of chromatography techniques and other separation procedures in order to purify both the precursor chemicals and final products. A precursor step in many of these procedures required the dissolution in water or in ethyl alcohol (ethanol) of pre-separation mixtures. Table 1 shows solubility levels, as well as melting and

Mark

Periodic Table

Question 1

Close and Return

(c) Next Step Pre-Med LLC

Don Johnson

Chemical and Physical Foundations of Biological Systems Passage 1 (Questions 1-4)

Pharmaceuticals that disrupt the microtubules of cells during the cell reproduction process can be an important component of treating such medical conditions as Kaposi's sarcoma and ovarian tumors. Paclitaxel is one such example of a pharmaceutical in this category, often known as "mitotic inhibitors."

Key terms: Kaposi's sarcoma, Paclitaxel, mitotic inhibitors

Cause and effect: these drugs inhibit mitosis because they disrupt microtubules

Research into medicines with bioequivalent properties to paclitaxel could lead to the discovery of ways to achieve similar effects with different molecular substances. One example of such research involved hydrolysis of paclitaxel molecules in an attempt to study the molecule's individual components. A diagram of one of the paclitaxel molecules in question appears below, along with post-hydrolyzed components.

Key terms: post-hydrolyzed components

Cause and effect: studying the structure can lead to new drugs with equivalent effects

Figure 1 Hydrolyzed products of paclitaxel

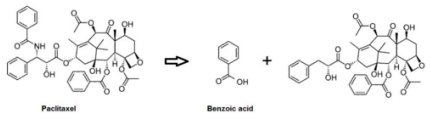


Figure 1 shows us that hydrolysis of paclitaxel yields benzoic acid

Periodic Table

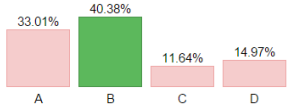
Question 1

Benzoic acid and t-butyl alcohol are both colorless substances at 20°C and at room temperature, as well as at 30°C. Would paper chromatography be an appropriate technique for the separation of benzoic acid from t-butyl alcohol?

A. Yes, because they have different molecular masses and capillary action affects them in different ways.
B. No, because there would not be any visible distinction between the two migrating substances.
C. It depends on whether the chromatography had a thin-layer component.
D. It depends on the pH of the solvent.

40.38% of students answered this question correctly.

Your answer was incorrect



Answer Explanation:

- Difficulty: 2 Medium
- Reasoning Skill: 3 Reasoning About the Design and Execution of Research
- Concept Category: 5C Separations and Purifications

B is correct. Paper chromatography is only effective if there is a visible difference between the substances being separated. Two colorless substances such as benzoic acid and t-butyl alcohol would likely migrate at different speeds, but it would not be possible to identify their positions.

A: The part about having different molecular masses is accurate, and differences in the speed of capillary action can be assumed. However, there would be no way to identify the locations of the substances at the end of the process, since both are colorless. Therefore, paper chromatography would not be helpful in this case.

C: The question doesn't state anything about the chromatography including TLC - the question is specifically asking about paper chromatography.

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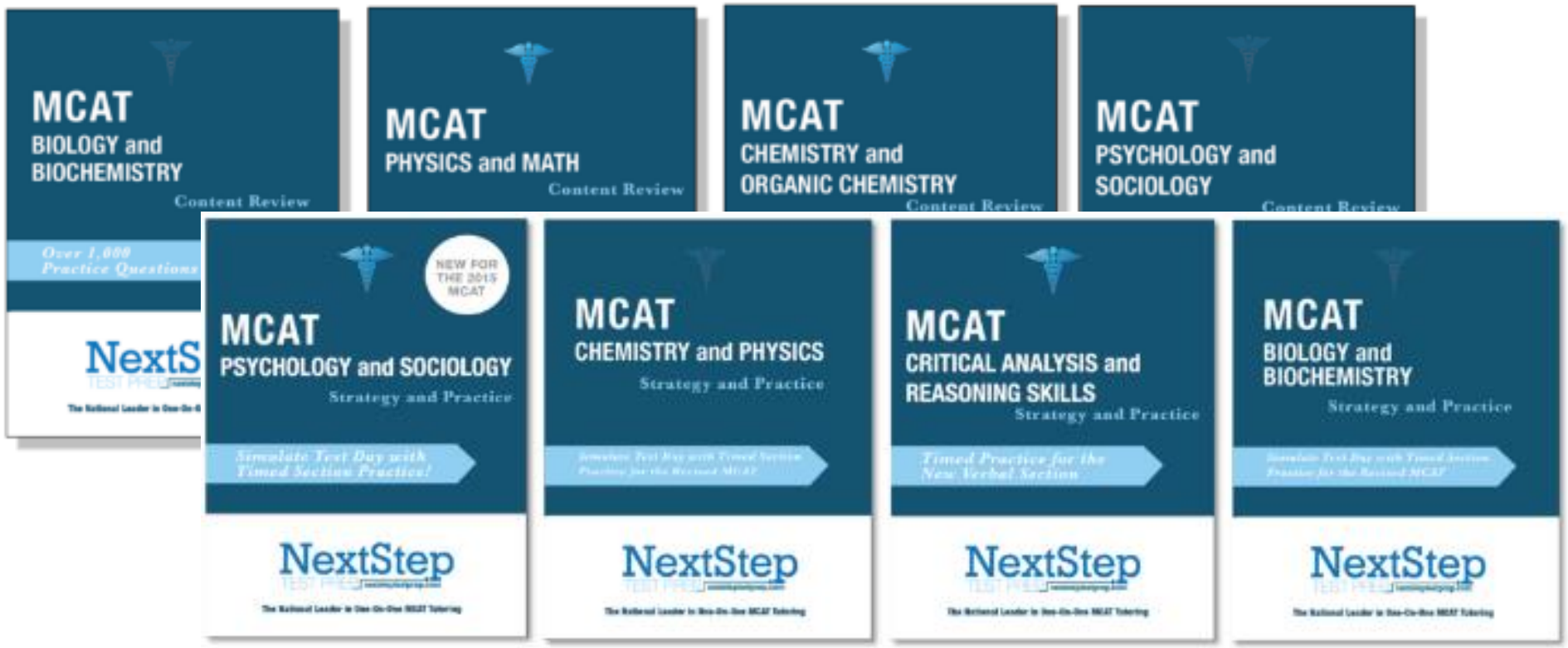

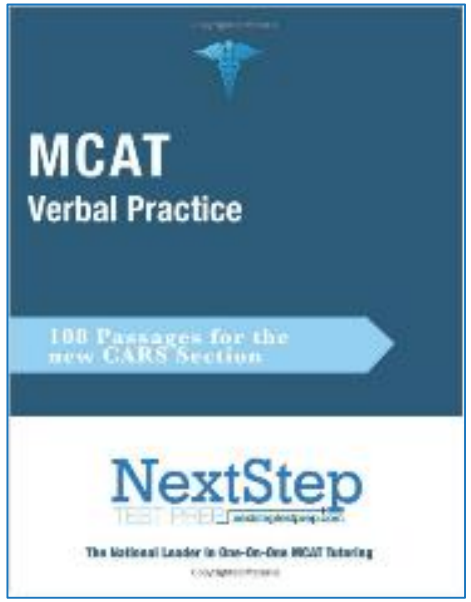

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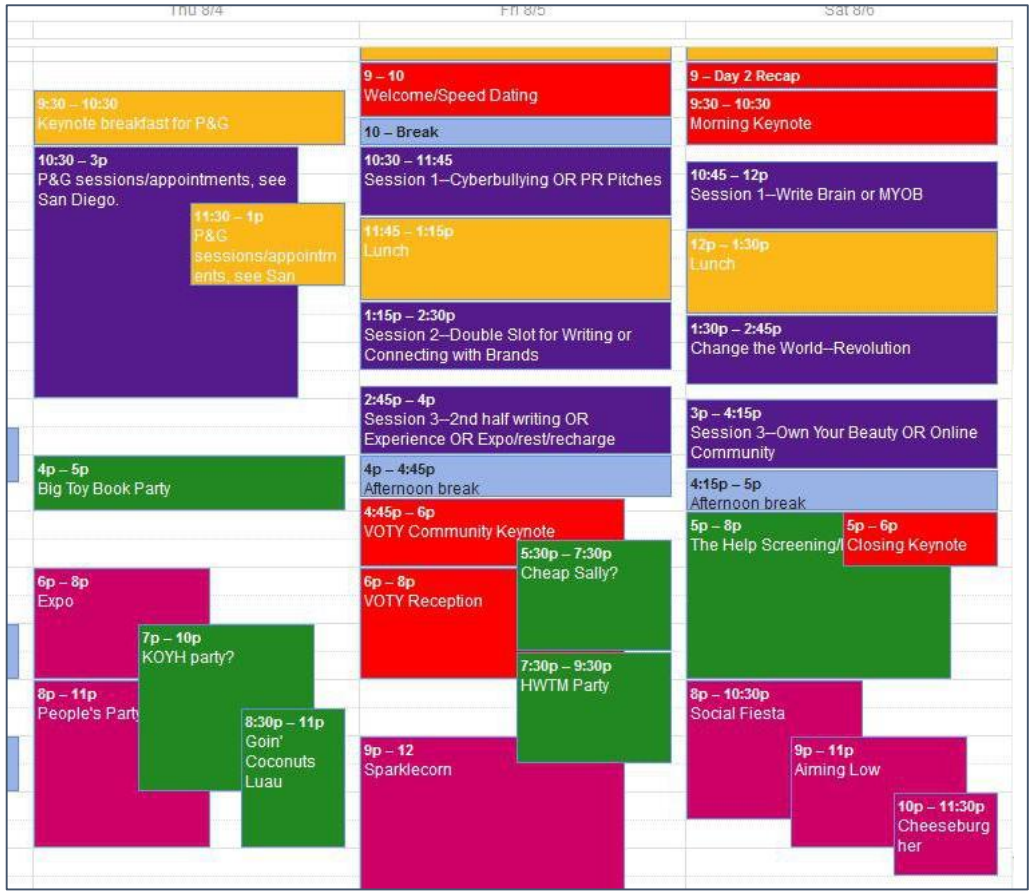

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