Academic Communication in Astrophysics Homework 2 — due by the end of 30/04/2025

Choose two paragraphs from two different sections in a paper you are currently reading (or choose from arXiv).

Copy the paragraphs here and provide the reference.

For each paragraph, discuss:

• What is the paragraph about? Does it contain a single idea/topic?

• Identify the topic sentence.

• Identify if there is a resolution, e.g., a summary sentence.

• Comment on the structure. Is this a point-first or point-last paragraph? Can you identify TS-D, LD, LDR or OCAR story structures?

• Is the paragraph clear and coherent? For example, does the paragraph have a consistent point of view and good flow? Are the sentences logically organized? Can you identify transitions, and are they effectively used? Is the writing concise?

• If you identified problems: how would you improve the paragraph?

Here is the paper I choose:

Galaxy And Mass Assembly (GAMA): stellar mass estimates
Taylor et al. 2011.
Monthly Notices of the Royal Astronomical Society, Volume 418, Issue 3, December 2011, Pages 1587–1620, https://doi.org/10.1111/j.1365-2966.2011.19536.x

Paragraph 1 (Section 1 Introduction)

One of the major difficulties in observationally constraining the formation and evolutionary histories of galaxies is that there is no good observational tracer of formation time or age. In the simplest possible terms, galaxies grow through a combination of continuous and/or stochastic star formation and episodic mergers. Throughout this process – and in contrast to other global properties like luminosity, star formation rate, restframe colour, or luminosity-weighted mean stellar age – a galaxy's evolution in stellar mass is nearly monotonic and relatively slow. Stellar mass thus provides a good, practical basis for evolutionary studies.

1. What is the paragraph about? Does it contain a single idea/topic?

   It explains why stellar mass is a superior tracer of galaxy evolution, contrasting it with more variable observables. And yes, all sentences focus on using stellar mass as a robust evolutionary metric.

2. Identify the topic sentence.

   The first sentence: "One of the major difficulties in observationally constraining the formation and evolutionary histories of galaxies is that there is no good observational tracer of formation time or age." It introduces the challenge.

3. Identify if there is a resolution, e.g., a summary sentence.

   I think there is no distinct concluding sentence. Although the final sentence ("Stellar mass thus provides a good, practical basis for evolutionary studies.") acts as both development and takeaway, I still feel like it is not a stand-alone resolution. It is more like a deduction from previous description.

4. Comment on the structure. Is this a point-first or point-last paragraph? Can you identify TS-D, LD, LDR or OCAR story structures?

   Point-first (TS–D / LD): topic then development.

5. Is the paragraph clear and coherent? For example, does the paragraph have a consistent point of view and good flow? Are the sentences logically organized? Can you identify transitions, and are they effectively used? Is the writing concise?

   - Coherence: new information always appears in the end of sentences.
   - Transitions: the dash in "Throughout this process – and in contrast to other global properties like luminosity, star formation rate, restframe colour, or luminosity-weighted mean stellar age – a galaxy's evolution in stellar mass is nearly monotonic and relatively slow." links ideas.
   - Conciseness: no redundant clauses .

6. If you identified problems: how would you improve the paragraph?

It think this paragraph is good enough, but I may break the second last sentence into two parts: "Throughout this process, global properties of a galaxy—luminosity, star-formation rate, rest-frame colour or luminosity-weighted mean stellar age—can vary dramatically. In contract, a galaxy's evolution in stellar mass is nearly monotonic and relatively slow."

Paragraph 2 (Section 1.2 Stellar mass estimation)

Stellar mass estimates are generally derived through stellar population synthesis (SPS) modelling (Tinsley & Gunn 1976; Tinsley 1978; Bruzual 1993). This technique relies on stellar evolution models (e.g. Leitherer et al. 1999; Le Borgne & Rocca-Volmerange 2002; Bruzual & Charlot 2003; Maraston 2005; Percival et al. 2009). Assuming a stellar initial mass function (IMF), these models describe the spectral evolution of a single-aged or simple stellar population (SSP) as a function of its age and metallicity. The idea behind SPS modelling is to combine the individual SSP models according to some fiducial star formation history (SFH), and so to construct composite stellar populations (CSPs) that match the observed properties of real galaxies. The SP parameters – including stellar mass, star formation rate, luminosity-weighted mean stellar age and metallicity, and dust obscuration – implied by such a fit can then be ascribed to the galaxy in question (see e.g. Brinchmann & Ellis 2000; Cole et al. 2001; Bell et al. 2003; Kauffmann et al. 2003a; Gallazzi et al. 2005).

1. What is the paragraph about? Does it contain a single idea/topic?

   It describes the standard SPS modelling approach, which is used to estimate stellar masses from photometry. And yes, all sentences focus on how to estimate stellar mass by SPS modelling.

2. Identify the topic sentence.

   The first sentence: "Stellar mass estimates are generally derived through stellar population synthesis (SPS) modelling." It introduces the SPS modelling here.

3. Identify if there is a resolution, e.g., a summary sentence.

   I don't think there is a resolution here.

4. Comment on the structure. Is this a point-first or point-last paragraph? Can you identify TS-D, LD, LDR or OCAR story structures?

   Point-first (TS–D / LD): topic then development.

5. Is the paragraph clear and coherent? For example, does the paragraph have a consistent point of view and good flow? Are the sentences logically organized? Can you identify transitions, and are they effectively used? Is the writing concise?

- Coherence: new information always appears in the end of sentences.
- Transitions: the dash in “The SP parameters – including stellar mass, star formation rate, luminosity-weighted mean stellar age and metallicity, and dust obscuration – implied by such a fit can then be ascribed to the galaxy in question” links ideas.
- Conciseness: no redundant clauses.

6. If you identified problems: how would you improve the paragraph?

   Similarly, for the last sentence, I will say "Such a fit yields a set of SP parameters, such as stellar mass, star-formation rate, luminosity-weighted mean stellar age, metallicity, and dust obscuration. These inferred parameters can then be ascribed to the galaxy in question."