## Student Worksheet: Analyzing a Journal Article

*Please read the assigned journal article and answer the following questions. Review the “Paraphrasing” module as needed to help you understand how to paraphrase to avoid plagiarism.*

Your name:  ____  Solution Set: Wave vs Particle  ____________________________  Date:  ____________________________


### Step 1. What is the purpose/hypothesis/aim/objective of the study?

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| **a.** Write down the exact statement in which the authors describe what they were testing. (Hint: This information may be provided in the article as a purpose statement or as a hypothesis). Include quotation marks around the exact wording, and indicate page number(s). | • “It is possible to state that light has only one nature as electromagnetic waves and deletes the confusion of its dual nature as particles that bounce electrons.” (p.221)  
• “Finally, this paper succeeded in introducing plausible explanations of results of Thompson’s experiment and other phenomena that end the confusions in defining the true nature of light and electrons as waves and particle.” (p.221) |

| **b.** Now describe the purpose of the study (as you understand it) in your own words. | The researchers believe they can remove confusion around the dual nature of light by using an entropy approach. They aim to demonstrate that light only has electromagnetic wave properties and does not have particle properties. |

| **c.** What was the “gap” in the research that the authors were trying to fill by doing their study? | The authors are aiming to shed light on an ongoing debate regarding the nature of light and whether it is a wave, particle or both. This experiment aims to demonstrate that light only has wave like properties. |
### Step 2. What is/are the major finding(s) of the study?

<table>
<thead>
<tr>
<th>a. Make some notes about the authors’ major conclusions or findings as written in the article. Include quotation marks whenever you use their exact wording, and indicate page number(s).</th>
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<tbody>
<tr>
<td>“Hence: the light is only a wave but it may gain an electric potential that ionizes it and converts it into a flow of electric charges.” (p. 225)</td>
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<tr>
<td>“Such postulates clarify the confusion regarding the duality property of particles and light and lead to finding plausible explanations of other phenomena as sintering phenomena, de-Broglie hypothesis and thermoelectricity.” (p. 226)</td>
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<table>
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<tr>
<th>b. Now write those conclusions (as you understand them) in your own words.</th>
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<td>Light only has wave properties, but through ionization it can be converted to have particle properties.</td>
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<tr>
<td>Light only has one nature, as a wave. Knowing this helps explain other concepts such as sintering phenomena, the de-Broglie hypothesis and thermoelectricity.</td>
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### Step 3. How did the authors test their hypothesis?

<table>
<thead>
<tr>
<th>a. Briefly summarize the main steps or measurements that the authors used in their methods. Try to explain in your own words as much as possible.</th>
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<tbody>
<tr>
<td>The authors explain using mathematical theories a number of physical characteristics of light and how they link together to develop a new theory for the nature of light.</td>
</tr>
<tr>
<td>They explain the mathematics and connections between numerous concepts given information on revealed in previous research that focused on an entropy approach for explaining light characteristics. This previous research is then connected to these concepts theoretically to outline their argument.</td>
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<tr>
<td>o electric charge and magnetic flux</td>
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<tr>
<td>o kinetic energy</td>
</tr>
<tr>
<td>o the flow of mass and energy</td>
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<tr>
<td>o simultaneous flow of particles and waves</td>
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<tr>
<td>o analysis of cathode-ray experiment results</td>
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<tr>
<td>o analysis of the photoelectric effect</td>
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<td>o De Broglie waves</td>
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<td>Step 4. How reliable are the results?</td>
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<tr>
<td>b. Do the authors suggest any problems or limitations with their methodology? Do you see any problems or limitations with their methodology?</td>
</tr>
<tr>
<td>The authors suggest no limitations. The limitation of this experiment is that it is theoretical in nature. Developing actual experiments that test this new hypothesis will improve the argument the authors are making.</td>
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<tr>
<td>c. How did the authors analyse their data? What test/s did they use?</td>
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<tr>
<td>The authors collect no primary data. Rather they review previously completed experiments under the microscope of new information in terms of the entropy approach.</td>
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</table>
Step 6. What is the importance of this scientific work?

<table>
<thead>
<tr>
<th>a. Write (in your own words) the significant contributions of the experimental work in this journal article as reported by the authors.</th>
<th>The authors have developed a proof for the concept that light does not have duality properties, but rather is strictly wave-like in nature and that through the photoelectric effect it may gain an electric potential that converts it to a flow of electric charges.</th>
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<tbody>
<tr>
<td>b. Re-read your notes and explain why you think this is</td>
<td>This is a strong article and study as it takes new information developed elsewhere and compares it to a number of theories to develop further understanding. The mathematics is laid out clearly, and connects one concept easily to the next. It would be beneficial for other physicists and mathematicians to check the mathematics for accuracy and logic.</td>
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<tr>
<td>a strong or weak scientific article</td>
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<tr>
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<td>o a strong or weak scientific study</td>
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**Resources for students:**

1. If you are struggling with plagiarism and paraphrasing, then refer to our online “Paraphrasing” module.
2. If you are struggling with figuring out how to read the information, then refer to the section on active reading in the “Learning from Textbooks” section of A Guide for University Learning.
3. If you want to learn how to find more academic information on other science topics, then refer to our online “Searching for Scientific Journal Articles” module.