

Examples of Levels of Coherence

Note: All student work in this file has been left as the students wrote it on the computer.

Code 0: Incoherent

Code 0 letters include a complete lack of coherence in their ideas. These letters are often very brief or incomplete (see, for example, S102 & S108). Students who write letters like this often rely heavily on everyday experiences (see S419 & S426), to the exclusion of knowledge attained in science class. These students say all the claims are valid (see S213 & S228), and often cite no principles. The letters may include critiques of the evidence or claims (see S312 & S329)—but those critiques are not based on any scientific knowledge (normative or not).

S102 & S108

Dear Weekly World Science News,

Section 1: Introduction

Thank you for asking us for help in correcting and critiquing your artical. We had a fun time cratiquing you claims. We did some miner adjusting in some of your articles.

Section 2: The Claims and their Evidence

- For Bicyclists at Night we think that the evidence is not valid because it might not be true if the person had reflectors on his bike.
- We think that they could do some tests to prove that people get hot wereing black than white.
- We think that the evidence is not cradible because they do not have enough evidence to prove it is true.
- The evidence does not stay on the same topic.

Elizabeth A. Davis
University of Michigan

Section 3: Evidence Guidelines for the Reporters

We think that they could do some tests on other things to prove their claim. The proof they have is not all substantial evidence. It's there, but it either doesn't make sense, or proves nothing.

Section 4: Conclusion

We think that they could do some tests not only to prove it to the readers but to themselves, and try to make sense of what they are writing.

Sincerely, 108 & 102

S213 & S228

Dear Weekly World Science News,

Thank you very much for the chance to help the Weekly World Science News. We have some suggestions that will make your paper's article much more believable and scientific. We will try to explain our suggestions as well as we can so the reporters will be able to learn what they should do in the future.

The first claim that we critiqued was the claim that said that black attracts heat. This is a very valid and believable claim. We know from experience that black materials get hotter, faster than white materials. The only changes we would make are to leave out the part about black and white shirts at night. It is confusing because at night it is usually cooler than in the day, so of course nothing would change very much temperature wise.

The next claim we critiqued was the claim that said heat sources cause temperature to go up. We think this is a valid claim because it makes sense when it is a hot day and you add more heat it gets hotter. We think this claim would be more valid if you added the houses with small rooms and small kitchens would heat up faster than other houses. You are just assuming that small kitchens and small rooms go together.

The next thing we critiqued was the claim that said some materials are naturally cold. We thought this had medium credibility. We thought this because it sounded a little unbelievable. It seemed like it could be true but it sounded a little like a tabloid. The changes we would make are: leave out the part about the anti-heat shirt, it sounds like a tabloid.

Now, we'll give you a set of guidelines that your reporters should follow when they use evidence. One question that the reporters should ask themselves is: would I see this in the National Inquirer? If it is then chances are that it would not be a good article to put in the newspaper. Like the anti-heat shirt. Doesn't it seem like it would be in the National Inquirer? Also try to make things as simple as possible. Otherwise it sounds like a bunch of science mumbo-jumbo and no one can understand it.

We tried to give information on which evidence and claims are scientifically correct and which are not. We also tried to give you reasons for every suggestion we made. We tried to keep reporters in mind as we wrote our reports, so it would be appropriate for you. We tried to make our suggestions and comments very clear. We hope our report on your paper's article has been helpful.

Elizabeth A. Davis
University of Michigan

Sincerely, 228 and 213

S312 & S329

Section 1: Introduction

Dear Weekly World Science News,

Thank you for asking us about our opinions. We have a few things that we would like to help you with that might make your article less complicated to understand. We will try to be as specific as possible so that there are no misunderstandings about our opinions.

Section 2: The Claims and their Evidence

Claim 1: Energy conservation principles indicate that black attracts heat

- In thinking about the validity of this claim, we think the information given is accurate and correct. We feel this way, because yes, we do agree that black attracts more heat than white.
- We don't think that this claim needs to be changed, because we feel that it is valid as it is.
- We feel that the evidence shouldn't be changed, because it thoroughly supports the claim.

Claim 2: Heat sources cause the temperature to go up

- In thinking about the validity of this claim, we think that the given information is of medium quality. We feel this way, because it doesn't give precise information on how big the room was, or on how hot the temperature of the oven was.
- We think that the claim should be changed in the following ways: the oven temperature should be given, and the size and original temperature of the room should be given.
- We think that the evidence does support the claim, but it should have given the size and original temperature of the room, as well as the temperature of the oven.

Claim 3: Some materials are naturally cold

- We feel that this claim is not very valid, because neither my partner or I have experienced being in a room with all marble, so we don't know if this claim is necessarily true.
- We think that the claim itself is true, and is very valid.
- We think that the evidence should be changed, by telling why some materials are naturally cold.
- The evidence we critiqued doesn't really support the claim, because it doesn't say why the materials are cold, though they do say which ones are cold, though.

Section 3: Evidence Guidelines for the Reporters

Here, we will provide you with a set of guidelines that we recommend your reporters follow when using evidence. We will suggest what they should consider when they think about the evidence.

Elizabeth A. Davis
University of Michigan

- Write the evidence in a way so that children can relate to and understand it.
- Give more detailed information that is harder to argue with.
- Write about more interesting claims and topics.

Section 4: Conclusion

We hope that this will help your paper's articles, and will get more people to be interested in the topics you write about. We tried to critique the claims as best as we could. We hope that we were not too frank in stating our opinions, and that you take into consideration what we said. We took into consideration that we were making guidelines for reporters, not students. We would like to say thank you for asking our opinions, and we hope that you enjoy reading our comments.

Sincerely, 329 & 312

S426 & S419

Dear Miss. Q.,

We read your letter, and we thank you for the piece of evidence for us to start off with. Here is what we thought, and some suggestions for the future.

When we read the pieces of evidence that were presented and we critiqued them we thought that most of them did not help your case as much as they could have. We think that the evidence needs more proof, and also more trials.

We didn't think that the bench recommendation made too much sense because it said that we should wear things such as marble, or metal benches. Also the anti-heat shirt, there was nothing telling us what the shirt was dipped in. Some people might have allergies that would be affected by the chemical. (Those are two of the recommendations that should be removed). The claim about the cookies also needed to be removed because cooking is a big part of some peoples' vacations, or summers, and what you're saying is that they should just forget about their plans if they had any (along the lines of cooking), in fact most people will not want to do that.

When writing claims and pieces of evidence in the future we would recommend that you would be more specific in presenting your evidence, and also to try your experiments more than just once under different circumstances.

Thank you, and we hope that this helps you in the future also to make your news paper more believable.

Sincerely, 419 and 426

Elizabeth A. Davis
University of Michigan

Code 1: Lack of Coherence

Code 1 letters usually make at least one connection on one claim. However, the other non-normative claim is usually considered valid. The students who write these letters give at least one example of a lack of coherence. For example, they may say "black absorbs heat" in addition to saying "black absorbs light and converts it to heat" (see, for example, S111 & S125). Students who say "some materials feel cold" without explaining if there is a difference between feeling cold and being cold are considered to have a lack of integration (see S302 & S330). Sometimes the lack of coherence is partly a ramification of not addressing the claim at all (see S111 & S125).

S111 & S125

Dear Weekly World Science News,

Thank you for the opportunity to help the Weekly World Science News. We would like to give some suggestions to you that could help your reporters to make the article more believable and make it so you can be more accurate in your future articles. We hope to be helpful in as nice a way as possible. We also hope to be able to help you with the sales of your products by making the claims and evidence more accurate and true.

The claim "Energy conversion principles indicate that black attracts heat" in our opinion is, well, wrong or invalid. The reason that we think this is because black doesn't attract heat but just absorbs heat. If it attracted heat then for example, let's say you are in a room and you are getting heat in from the ceiling and on one side of the room there were ten people in all black, and on the other side of the room there were ten people all dressed in white. What this article is saying is that most of the heat will go to the side of the room where the people in black are all at in this situation. Now you should know that this would certainly not happen. The way you could change this claim to make it more accurate, is that you could say that instead of attracting heat, just say that it absorbs the heat and light (and when light is absorbed it changes into heat energy) that is coming to the black material or object. You can prove this because the evidence about the T-shirts on the Beach says that after a while the person in the black was much hotter than the person in the white clothes. That doesn't mean that it attracts heat but it means that it absorbs heat and light.

"Heat sources cause the temperature to go up" means that if you have any kind of a heat source anywhere, then the temperature around the heat source will rise. We think this is a valid claim because if you add any amount of heat to an object, area, etc. it will cause the total temperature to go up.

Elizabeth A. Davis
University of Michigan

We think that the oven experiment is valid because we know it is a heat source and that it can and will heat the room around it no matter what the size of the room is.

We think that if the variables were controlled in this experiment it would have been more valid, but because there were more people taking the temperature in the smaller room, that changes the whole outlook on it. The reason we think it's invalid is because the temperature in the smaller room would obviously be higher than the bigger room because of their body heat. Also the temperature could have gone up if there was more computers in the small room than in the larger room. We think that the evidence would be more valid if the rooms had the same amount of stuff in them.

"Some materials are naturally cold" The Anti heat shirt was a little invalid because the company did say anything about what the results are. The only thing that it told us about was how much it costs and what number you need to call to buy or get more information. Someone is not likely to call a number just for some evidence. We really think that if they were to put something on why the heat shirt is so good to wear on hot days that more people will be likely to buy the product.

The Godilock and the three benches we think that this claim is pretty accurate but there are a couple of things that they didn't cover like were the benches were if the marble, concrete, and metal benches were outside in the cold they would probably be colder than the wooden bench if it was inside. So if they told where each of the locations of each bench were and the temperature in which they were located in it probably would be more accurate

We hope our report on your paper's article is helpful. We tried to provide information on which evidence and claims are scientifically OK and which are bogus. We also tried to give you a reason for every decision or suggestion we made. We tried to keep reporters in mind as we wrote our reports, so it would be appropriate for you. We tried to make our suggestions and comments very clear.

S302 & S330

Dear Weekly World Science News,

Thank you very much for the opportunity to help the Weekly World Science Week. Thank you also for asking our opinion and letting us help making the Weekly World Science News a bigger hit. We will try to be very clear and explain our suggestions thoroughly so the reporters will be able to learn what they should do in the future.

For each of the claims, we will:

- *Say whether it is usable or not, and why
- *Say how it could be changed to make it believable
- *Critique the evidence and explain how they could be changed and
- *Explain how the evidence supports or doesn't support the claim

The first claim was: Energy conversion principals indicate that black attracts heat. This claim is useable, because in the summertime, there is a lot of heat and sun. This claim should be changed to: black absorbs light energy, and changes it into heat energy. The evidence that we chose was: T-shirts on the beach. This evidence supports the claim because the black T-shirt

Elizabeth A. Davis
University of Michigan

absorbed more light energy than the white t-shirt did. The claim said that black attracted heat.

The second claim was: Heat sources cause the temperature to go up. This claim is usable because when the heat source is on, the room temperature gets hotter. This claim should be changed to: Heat sources can cause the temperature to go up when the source is -- degrees higher than the room temperature. The evidence that we chose was: The oven experiment. This evidence supports the claim, because an oven provides heat, and some of the heat escapes the oven and gets into the room. That makes the temperature go up a little bit.

The third claim said that some materials are naturally cold. This claim is not usable. It doesn't seem practical to go to the park in the summer and not sit down if there are only wooden benches. We thought that this claim should be changed to: Some materials feel colder than they really are. It just doesn't make any sense saying that some objects are naturally cold. The piece of evidence that we decided to do was the Anti-heat Ice Cloth Shirt. This doesn't have much to do with the claim, but it was interesting. What would make this claim more believable is saying where or which catalogue they found it in.

We think that your reporters should say where they came up with the idea, how you got the information and where. If there are polls, you should ask different ages. If the poll happens to be about taxes, then you can't ask young people but, if you state what ages you polled, it could be more believable. You have to consider that if the reporter doesn't believe the story, chances are, no one else will. The article should be interesting and worth reading and not baist. If an article is not any of those things, than people will probably just skip over it. If you have a whole magazine with articles that are not interesting, no one will read the article.

We hope our report on your article was helpful. Hopefully we provided information which are scientifically OK and is helpful into making this article a bigger success and more believable. We tried to make our comments and suggestions understandable and useable. Thank you again for this opportunity to help make Weekly World Science News magazine more successful.

Sincerely, 302 and 330

Code 2: Adequate Understandings

Code 2 letters indicate that students have a reasonably adequate understanding of the science (see, for example, S411 & S429). They generally link evidence to claims, though this is not a requirement for this level of coherence. These students can express contradictory ideas (for example, that "black attracts heat" and that "black absorbs light and converts it to heat"). However, it must appear that they actually understand the science (see, for

Elizabeth A. Davis
University of Michigan

example, S116 & S122), as opposed to those letters which receive code 1, where the students' understandings appear quite tenuous.

A few letters were coded as adequate when they showed a significant split in their understandings of the multiple claims. For example, students who showed excellent integration on the first claim but no integration on the third claim (or *vice versa*) would be coded as code 2 (see, for example, S428 & S403).

S411 & S429

Dear Weekly World Science News,

We received your letter asking us to help you critique your article on "Keeping Your Cool in the Summertime" and we are pleased that you would consider us to help you make your article even better than before.

In reading the article we noticed some areas where the article could be improved. So we took it upon ourselves to critique some of the weak areas which we will note below.

Let us start with the first claim: Energy conversion principles indicate that black attracts heat.

We think that this claim is invalid and here is why:

First of all you should change the title, because black can't really attract an inanimate object. You should say that black absorbs and not attracts. Secondly, you shouldn't say that black absorbs heat because black absorbs light energy which is then converted into heat energy. Therefore the title should read "Energy conversion principles indicate that black absorbs light energy."

For this claim, we believe that the evidence was collected poorly. The evidence doesn't include what the temperature was that day, if it was cloudy or clear, if one person was on white sand and the other was on black sidewalk, if one was out longer than the other, these are variables that need to be included but aren't. The evidence itself is logical and makes sense due to personal experience, but we believe that it could be more detailed and contain more variables. This would help other people to believe this too.

Next, there is the claim: Heat sources cause the temperature to go up.

This claim has a very high validity rate because it is very sensible and reasonable. It really makes sense to us. Therefore you shouldn't change this claim at all. There are a lot of visual information, graphs, charts and other things that help you to prove your theory.

Thirdly, there is the claim: Some materials are naturally cold.

We rate this claim as very, very low because:

Elizabeth A. Davis
University of Michigan

We believe that materials aren't naturally cold, but that it is the difference between the material's temperature and our body temperature that we are feeling. We think that it should be changed to "Stay close to materials whose temperature is lower than you body temperature, to keep you cool. This would make the claim not as broad.

We think that you should have taken actual data instead of just having someone tell you how the material feels. This way the claim would be more convincing and have more information to back it up.

Here are some helpful hints that your reporters should use when they collect and use evidence:

First of all they should do research on the principles of the claim that they have made.

Secondly, they should think about some experiment that they could make that has controlable variables.

Thirdly, they should do the experiment, controlling all the variables, and using not only people to collect data, but also machines like thermometers to make sure that things are the way they seem to be.

And lastly, your reporters should piece the evidence together in an article, saying exactly what they did, step by step. Then they should organize it in a understandable article.

We hope that our hints are helpful for you and your reporters. We have tried to make corrections that are to the best of our ability. We have also thought about principles that you could include to help make your article more sensible and scientifically correct.

If you would like our advice on anymore of your future articles, please don't hesitate to ask.

Thank you.

S428 & S403

Dear Weekly World Science News,

Section 1: Introduction

We thank you for the chance to enhance our critiqueing ability by giving us the chance to look over you newspaper. We hope that you will be able to use our ideas to make your magazine the best ever. We will write our letter so it is easy for you understand what the good things about the magazine are and what the bad things are.

Section 2: The Claims and their Evidence

To help you make a better magazine these are the ideas that we have come up with. First of about the claim; Energy conversion principles indicate that black attracts heat. We have realized that this claim is invalid and that if you want people to believe what you are writing that you have to get your claims straight! What we have come up with for the correct claim is that energy conversion principles should indicate that black absorbs light energy then converts it into heat energy. The evidence for bicyclist at night was very useful to us. We think this

Elizabeth A. Davis
University of Michigan

because they showed enough evidence for us to believe and they backed up the evidence in a way that we can understand. We think that the evidence supports the claim that we came up with because in bicyclists at night it says that the person feels the same temperature even though they were wearing different color clothing. They felt the same temperature because there was not a lot of light energy which converted into heat energy. The next claim is; Heat sources cause temperature to go up. We think the claim is valid because when a lot of people are in a room the room is much hotter than when you are alone in a large room. We think that the claim is valid because heat sources cause a temperature to go up. Since the evidence is so easy to understand we feel that we don't need to change it. A critique helps the claim because we are not saying anything bad and we think the evidence is very helpful. The last claim is; Some materials are naturally cold. The Anti-Heat Shirt is a good example because the heat shows that some things are naturally hot and naturally cold. One thing that I would suggest for this part of the article is instead of calling it heat sauce to call it heat formula. This way people may believe it a little bit more if you use a more scientific name. But we did think that the article on the heat sauce was pretty informative and there was a good description on how everything worked.

Section 3: Evidence Guidelines for the Reporters

When reading the article we noticed that sometimes you say things that sound like they are from a tabloid magazine. For instance when you were talking about the white shirts on the beach you said that there was a report that something somebody said that they were hot too, but it sounds very much like a tabloid. Also when you type the article maybe you should survey more than 1 person then the reader might believe your claim a little bit more. And the other thing is that when you type your claims maybe you should have someone look at the evidence again for you to have a better article.

Section 4: Conclusion

We liked critiquing these articles and claims for you. We hope that you will appreciate our helpfulness and make some of our corrections in your magazine. We hope that you think our corrections are clear and understandable.

Sincerely, 428 and 403

S116 & S122

Dear Weekly World Science News,

The article you wrote was written well but there are things to improve. We have read the claims, evidence and the article and critiqued them. We will try to explain our suggestions as best as we can.

When we critiqued the evidence and the claims we noticed a lot of good things and a lot of things to improve.

The first piece of evidence that we critiqued was the Bicyclists at night. This claim was very valid. The claim was... Energy conversion principles indicate that black attracts heat. The evidence makes a lot of sense but did not support the claim very well. The claim is true and the fact is true but was only explaining how the black attracts heat, but not explaining

Elizabeth A. Davis
University of Michigan

how the black absorbs heat and is harder to see and how the white reflects light and is easier to see at night. To make the claim more valid you could explain all the evidence next time you write a claim and, for this particular piece of evidence you should explain about both the white and the black in the claim. The claim needs a few improvements but it is true and the evidence is true. A lab that 116 and I (122) have done before that supports this claim and evidence was a lab that we had a flashlight and different backgrounds such as a mirror, a black, a white, a silver, a shiny silver, and a shiny white. The light was shined on the backgrounds and then the temperature was taken. It proved that the black absorbed more light and grew hotter and the white reflected the light and did not become as hot as the black. The evidence was very well explained.

The second piece of evidence and claim we critiqued was the Oven Experiment. The claim was...Heat sources cause temperature to go up. This claim explained that if you have a heat source on that the temperature will go up that is around the heat source. The evidence that you did supported the claim well. The lab you did makes it very believable. When you turned on the oven and took the temperature in segments of two minutes, the temperature did go up around the heat source, the oven. The lab that we did that supports the evidence and claim was the equilibrium lab. That was when we put hot water into cold water and then took the temperature. The heat source was the water and the temperature around it was the cold water. The cold water's temperature went up.

The Third piece of evidence and claim we did was the Goldilocks and the three benches. The claim was... That some materials are naturally colder than other materials. The claim is valid but sort of hard to understand. My questions are...1. What materials are naturally cold?

2. Why are some materials naturally colder?

We did not quite understand everything about the claim or the evidence. The lab you did to prove this theory was well done and the actual testing, made sense but there are a lot of questions. When you went around testing the benches I can understand the wood bench being warmer than the other benches but why. You also did not explain if the temperature around the bench had anything to do with why the bench was warmer or colder. You should use more information to make this more believable. There are a lot of questions to answer. Also the claim needs to explain the evidence a little bit better. You need to include what materials are naturally cold and why they are naturally cold. Also your lab that you did to try and prove this needed to be more specific, such as telling what kind of room temperature the bench was in and why the bench was naturally colder than the other materials.

When you write any other pieces of evidence or articles you should think of all the questions that could be asked about the theory and try to answer things. Then you should make sure your evidence is correct. Also see if there is any other information you could add or improve. If you ever have to do any other articles set some guidelines. Some of the claims you had done were excellent and believable, and some need a little improvement. Always check your work and make sure the claim fits the evidence. Also make sure your lab answers the facts and supports the facts that are in the claim.

I hope that you will be able to use the information that we have provided to help you when you have to write any other articles. Use our guidelines to help and our suggestions. We explained our critiques and questions so also use those to help answer questions that any other

Elizabeth A. Davis
University of Michigan

person could have. Always make sure your evidence is clear and makes sense. Thank you for your article and I hope I could help.

Sincerely, 122 and 116

Code 3: Excellent Understandings

Code 3 letters demonstrated excellent understandings of all of the claims. These students do not necessarily link claims to evidence in each case, but also do not cite contradictory ideas (see, for example, S318 & S319). These letters can be quite brief, in part because students demonstrate such a parsimonious understanding of the science (see S527 & S508).

S318 & S319

Dear Weekly World Science News,

Below are a couple examples of different suggestions that we have made to help the Weekly World Science News. We appreciate the opportunity to help you, and hope that our suggestions will make a difference. We enjoyed critiquing the evidence, and will try to explain ourselves as thoroughly as we can.

Claim 1 : Energy Conversion principles indicate that black attracts heat :

We thought that your first claim has medium validity. Black does not attract heat. The light energy is emitted from the source and gets absorbed by the black surface, which is then converted into heat energy. So lighter colored materials are less hot because it reflects more energy than it absorbs, leaving less energy available to convert into heat. This claim should be changed to black absorbs light energy which then gets converted into heat.

Claim 2 : Heat sources cause the temperature to go up :

This claim you have made is somewhat valid, only in certain conditions heat sources will make the temperature go up. If the temperature of the object that the heat source is changing is less than the temperature of the heat source, it will cause the temperature to go up until it reaches the equilibrium with the two objects. If the temperature of the surroundings is greater than that of the heat source then the surroundings will heat the heat source instead because the surroundings are hotter. This happens until both objects reach the equilibrium.

Claim 3 : Some materials are naturally cold :

This claim is not valid, and needs more supporting evidence. Naturally cold materials are usually things that melt at high temperatures such as metal, glass, concrete and marble. When these objects are touched they "feel" cold but actually they are exactly the same temperature as the surrounding air or room temperature. This is because for example when you

Elizabeth A. Davis
University of Michigan

touch a rod of metal it feels cold this is because heat energy from your hand, which is usually hotter than the surrounding air, will flow from your hand into the metal thus making it feel colder. The metal will then eventually warm up, so it can be a good place to keep cool but is not really a colder temperature. We think you should change this claim to Naturally Cold objects seem cool, but aren't.

As reporters, you should always use more evidence and possibly polls of several well-known or local scientists. It is nice to use pictures or graphs and examples to make a more exemplary presentation. Statistics are also good aid, which makes the article more believable. Simple claims made by the writer are not believable unless backed by several pieces of valid evidence.

319 and I hope our report on your paper's article will be very helpful in writing future articles which will be more believable. We tried our hardest to give you the most detailed descriptions and additional evidence of our knowledge. We also backed most of our new and changed claims with several pieces of evidence which you may or may not find useful and believable.

Sincerely, 319 and 318

S510 & S524

Dear Weekly World Science News,

Section 1: Introduction

We are very honored to work with the Weekly World Science News. We have many changes and suggestions that will help improve your newspaper's credibility. With our help, we hope that your paper will be more believable, truthful, and scientifically correct. We hope that our suggestions will be useful to you in the future so that you can continue writing your articles the way they should be written.

Section 2: The Claims and their Evidence

For each claim, we will state whether or not the claim is valid, whether the claim is worth including in your article, and whether or not the evidence that you used supports the claim.

We think that the evidence that you used in this article, is not that bad. The science is correct, and the usefulness is okay on most of them, but they just need to be reworded. The order of the claims needs to be changed in order to make the evidence fit together in a logical way. Some examples of the things that need to be changed are...

- With the claim your making about how black clothing attracts heat, this is not totally correct. Black doesn't attract heat at all, but it does absorb light energy which is changed into heat energy. When rewriting your article, you should say that black absorbs more light energy, not attracts heat. This is a very good claim to include in your article. The science is good, and the evidence is trustworthy.

- With your claim that some materials are naturally colder, this is not true also. The reason that (for example) metal seems colder than wood, is not because it is colder, because it isn't, but because it is a better energy conductor. When you touch metal with your hand, the heat energy

Elizabeth A. Davis
University of Michigan

that is collected in your hand flows very rapidly into the metal, and in that way, cools down your hand very quickly. A wood object, when you touch it with your hand, does the same thing as the metal, but much less rapidly. This is also a good claim to include in your article about heat in the summertime. But I would suggest an experiment about how fast the energy flows through the metal and wood.

-Thinking about your claim about how the oven heats up the room, I think that this is also a good claim to include in your article. But, I think that it is not as important as the two above. It is a good piece of evidence, it is just not very important. I think that you should not put too much emphasis on this claim, but don't not include it at all. I think that in order to make this claim more believable, you should add an example of a certain situation such as the one that I have written about in my notes. This would put the person in a situation where they are forced to think about the claim and realize that there is no way that it can be untrue.

- In thinking about your claim about the anti-heat shirt we think you should not put too much emphasis on this claim. This is not going to have as much effect on a person's overall temperature as say the fact that they should wear light colored clothing. When you are writing your final article, you should put this in, and maybe include the article with it, so that the person who is reading this will know what you are talking about.

Section 3: Evidence Guidelines for the Reporters

When your reporters are writing about scientific claims, often, it makes the article more believable if you use situations that, undoubtedly, people have encountered some time in their life. Using an example, like when you told about how the metal bench was too cold, and the wood bench was much warmer, will make your statement more believable. Also, you should write your claims in a way that makes sure that it is not saying something that is untrue. You should always state exactly what you mean to say, even if it takes up a lot of room. Also, start out your article with the claims that are most interesting or most informational. Like in this article, you should put the claim about wearing white clothing at the top of the paper because it is something that people know are true, and it is also what will probably effect your heat in the summertime more than the other claims.

Section 4: Conclusion

We hope that our help with this article will be a big help. We hope that with our advice, the article that you presented us with will be very clear, truthful, and scientifically correct. We tried to make our suggestions clear and helpful for the future. With our advice, we believe that your reporters will someday be able to turn the credibility of your newspaper around.

Sincerely, 524 & 510

S527 & S508

Dear Weekly World Science News,

Section 1: Introduction

Thank you for the chance to help you improve your article on keeping cool in the summertime. We hope that our suggestions will help you. We think that the suggestions will make your article more scientific and credible. We have also tried to explain our suggestion as much as possible, so your reporters will understand what we are talking about.

Elizabeth A. Davis
University of Michigan

Section 2: The Claims and their Evidence

Claim #1 is not valid because black does not attract heat. It just absorbs more light energy than other colored materials. When the light energy is absorbed, it converts into heat energy. The more light energy absorbed, the hotter it gets. Another thing is that the reason why the person wearing the black shirt was not hotter than the person wearing white because, they were riding their bikes at night. Therefore there was no light for the black shirt to absorb. The 2nd claim is valid because heat sources actually cause the temperature to go up. The evidence is also true. If you use an oven, it will heat up the room, and smaller rooms do get hotter than bigger rooms. This is because there is less air in the small room to be heated than in the bigger room. The last claim is also not valid because some materials are not naturally cold. The reason why they feel colder is because the heat from your hand flows into the metal and marble faster than other materials. The faster the heat from your body flows into a material, the colder the material feels.

Section 3: Evidence Guidelines for the Reporters

Some guidelines for your reporters to follow is to consider all of the variables for an experiment before you write about it. You should not jump to conclusions when writing. Check to see if the evidence seems believable. If you are not sure, you should conduct your own experiment. Lastly if you feel that the results of an experiment are not logical, then maybe you should run the experiment again.

Section 4: Conclusion

We hope that our suggestions will prove helpful in your paper. We also hope that our suggestions helped you determine which claims were valid and that we explained clearly enough why. We tried to give you good reasons why some pieces of evidence were not correct and why some were. We hope to hear from you again.

Sincerely, 527 & 508

Code 4: Exceptional Understandings and Linkages

Code 4 letters would achieve the same level of understanding of the science as in code 3, but would additionally make meaningful links between evidence and claims in every case. No letters of this caliber existed in the dataset.