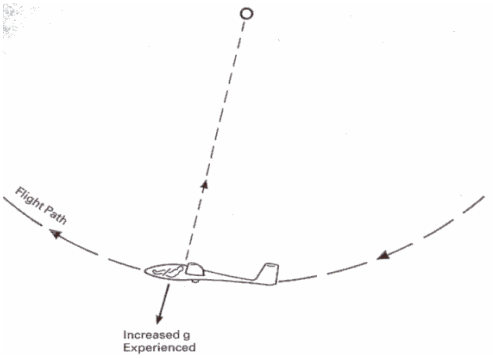
REDUCED G FAMIL

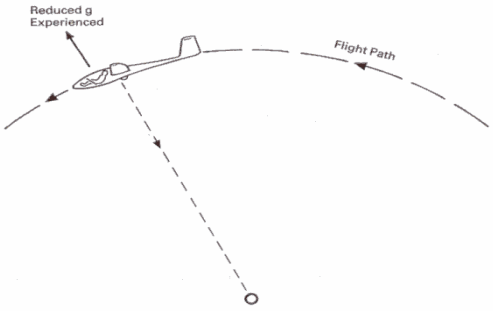
Aim: To familiarise you with the causes and sensations of flight at reduced G loading.

We have spent the majority of our life earthbound under the influence of the earth's gravity. This force on our body is measured in terms of what we weigh standing on the scales. The few times we have experienced being anything less than our normal weight is when we have been in an elevator moving up and down, in a car going over an undulating road or riding on some sort of carnival fair machinery. When doing any of these, we can feel our weight increase as we are forced towards our seat or feet as is the situation when the elevator moves off from ground level towards the top of the building. Conversely, we feel our weight reduce as we start from the top floor and descend to a lower level. In a car, this floating sensation is experienced when we speed over a sizeable hump in the road.

Positive G:
When flying, we have loads imposed on us whenever we manoeuvre or are subjected to turbulence. The loads that push us down into our seat and make us feel heavier are positive loads greater than the usual 1 G. These will have already been felt during turns and any pull-ups made in flight.



Reduced and Negative G:
Anything less than the 1G is considered reduced G and leaves us feeling lighter or floating. If we float neither up nor down, we are weightless or experiencing zero G. This is usually only experienced momentarily during some aerobatic manoeuvres so is not going to be dealt with here. However, just to complete the picture, if we were to roll upside down and fly along inverted, we would have to push forward on the control column and we would feel pushed against our straps and towards the canopy rather than into our seat. In this situation, we would be at –1G. This is quite an unfamiliar sensation for humans and can take a while to get used to having spent all our lives happily under a positive 1 G loading! For now though, we want to gradually introduce you to the sensation of reduced G so you can gain an understanding of what it feels like and how it occurs so we recognise it when we induce the sensation with our control inputs or have it imposed on us by the air we fly through.



Some people are more sensitive than others and some may even find the sensation unpleasant so we will aim to introduce you to the sensation gradually so as to stay within your comfort zone. For those that feel the sensation as one of falling, they may unwittingly extend arms and legs to involuntarily brace against the fall. Ever had one of those dreams where you are falling off a cliff or similar and you wake with a startle as your arms and legs involuntarily extend to the four corners of the bed? No… lucky… must be just me!
Anyway…its fine in bed but if flying along with one hand on the control column, the last thing you want to do is push forward if you sense you are falling as this will only make it worse!
So….just when might we expect to feel such a sensation in flight?

Reduced G can occur when:

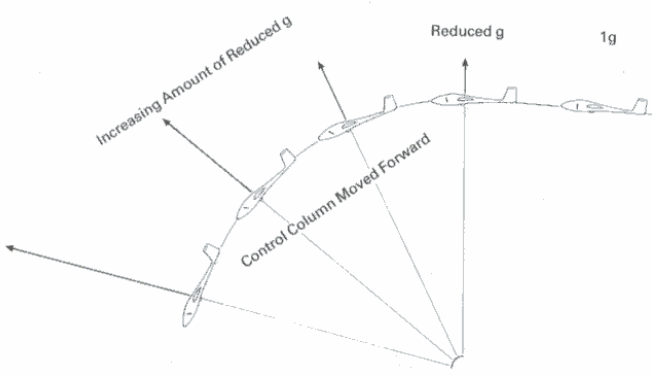
- We push forward on the control column to lower the nose form a high nose attitude as might be the case in a stall recovery
- We push the control column forward to lower the nose if the cable brakes on a wire launch
- We push forward suddenly on the control column for any other reason

Reduced G Compared to Sink When Stalled:

We will move on to exploring the handling and sensations of stalled flight shortly and one of the things you experience is the sinking sensation that can occur when the glider is stalled. The sink is infact a useful symptom of the stall, but not the only symptom and it can easily be mistaken for that induced by the pilot whenever they push forward on the control column.
Here-in lies the trap.

Sink is a symptom of the stall; **reduced G is not.**

We need to give you experience and confidence in discriminating between the pilot induced reduced G situation and that sinking feeling that may occur when a glider is stalled or during the pilots recovery as they push forward on the control column. If the reduced G sensation is sustained or increasing, it is essential that you realize that the glider is not stalled and that the sensation will cease if you stop pushing on the control column and pull back so as to pitch up towards the normal gliding attitude.



Air Exercise:
You need to be around 2000 ft agl for this exercise. Complete the pre manoeuvre (HASELL) checks then your Instructor will get you to follow through as they make gentle dives and pull-ups so you feel the increased G, then push-overs so you feel the reduced G. Practise some yourself to gain confidence with the new sensation, noting the reduced G comes in as you push forward on the control column.

Next, your Instructor will have you follow through as they dive, then pull up to about 30° above the horizon. Holding the nose up, the speed will reduce and the glider will stall, pitch forward by itself and then recover with a small input from the instructor. Note there is little sensation of reduced G.

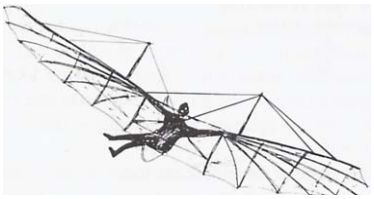
Following through, now repeat the dive and pitch up but before the speed reduces to near the stall, the Instructor will push the control column forward to lower the nose. Note this time the reduced G as a consequence of our control input. The glider is not stalled and remains fully controllable throughout.

You will be given control and asked to establish a steady glide at 45 knots. When told, move the control column forward sharply by a small amount to induce the reduced G sensation, then return to the steady glide.

Your Instructor will gradually expose you to more situations of reduced G so you gain confidence with the sensation and build up experience so there is no confusion between the sinking feeling that can occur during a stall and the sensation induced by us as pilots when we push forward on the control column. They will also be checking to ensure you are not one of a very small percentage of the population who remain hypersensitive to the sensation and continue to suffer discomfort and possible disorientation during reduced G manoeuvres.

Tips:
Experienced pilots can easily forget how they were sensitive to these unfamiliar situations and manoeuvres as they now cope with them without thinking. You however are still getting used to it so if you feel discomfort or worse, feel crook, speak up early rather than wait till you get lumps in your language!

Need To Know:
- How the sensation of reduced G occurs.
- How to discriminate between reduced G and sink.
- Not to worry about falling off cliffs or out of high-rise windows in your dreams!



Otto Lilienthal used this when jumping off cliffsback in the late 1800's

Further Reading:
- The Glider Pilot's Manual; by Ken Stewart. Pg 61. Reduced G famil
- Human Factors For Pilots; by Dr Ross Ewing. Good all round info on G tolerance and Human Factors.